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XL.—*Notes on Collembola.*—Part 4. *The Classification of the Collembola; with a List of Genera known to occur in the British Isles.* By JOHN W. SHOEBOOTHAM, N.D.A., Berkhamsted, Herts.

In my paper on "Some Irish Collembola" (1914), p. 59, I remarked that the classification adopted was one which, in the main, had been accepted by authors for the previous seven years, and that Dr. Börner had recently proposed a new system on which I should make some notes.

This paper was practically completed during the early part of 1914, but my unexpected call to South Africa prevented me publishing it, and I then intended waiting till I returned to England. However, as I am about to publish a preliminary account of the Collembola of Lancashire and Cheshire, I feel it is just as well to list them according to the new system, which is much to be preferred to any yet proposed. I therefore give here a translation of part of Börner's paper (1913 *b*), pp. 318–322, which forms a key to the new classification, and I append a list of the genera of Collembola hitherto found in the British Isles.

My best thanks are due to Dr. A. D. Imms, of the University of Manchester, for kindly seeing this paper through the press and for criticisms and suggestions, and to Mr. T. A. Coward, also of Manchester University, for much kind assistance.

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There have been many different arrangements of the Collembola made during the last 75 years, and the number of families recognized has varied from 3 to as many as 8.

Nicolet (1842) has the springtails divided into the *Smythurællæ*, *Podurellæ*, and *Lipurellæ*, and Lubbock (1862) called these *Smythuridæ*, *Poduridæ*, and *Lipuridæ*, while in his monograph (1873) he formed 6 families, viz., *Smythuridæ*, *Papiriidæ*, *Degeriadiæ*, *Poduridæ*, *Lipuridæ*, and *Anovridæ*. Various modifications were used by authors till the end of the 19th century, when another family—*Neelidæ*—was made for the reception of the genus *Neelus* of Folsom. Schäffer (1896), in his paper on "The Collembola from the Neighbourhood of Hamburg," differentiated the subfamilies *Isotominae* and *Tomocerinae*, which now rank as separate families.

During the present century the work of Börner has done much to advance our knowledge of the classification of the order Collembola. In one of his earliest papers (1901 *a*) he divided the Collembola into two suborders, the linear kinds to be grouped under the name *Arthropleona* and the globular forms he called *Symphyleona*. Keys were given to the families and subfamilies of the *Arthropleona*, and these, together with an account of the *Symphyleona*, were given in more detail in his paper on "The Apterygotat Fauna of Bremen" (1901 *b*). Then, in 1906, in his work on "The Classification of the Collembola," Börner discussed the whole group and the relationship of the families, subfamilies, and tribes. He recognized the families *Poduridæ*, *Entomobryidæ*, *Neelidæ*, and *Sminthuridæ*, and gave a synopsis of the subfamilies and tribes. This system, with but little variation, was used by authors for many years. Then, in 1913, when examining some species of *Pseudosira* and *Paronella* from Java, Börner happened to find a peculiar structure on the hinder trochanters, in the form of a number of short, outstanding, pointed bristles, to which he gave the name "Trochanteral organ." On looking through his collection of slides, he found that this structure was present in all the true *Entomobryinae*, but absent in the *Tomocerinae* and *Isotominae*. This discovery led Börner to propose a new arrangement of families, which I give in this paper. He firstly divided the *Arthropleona* into two natural sections according to the structure of the prothorax (see below, in Key to Families, etc.). The old family *Poduridæ*, which corresponds to the new section *Poduromorpha*, was divided into three, the subfamilies *Hypogastrurinae* and *Onychiurinae* being raised to the family rank, and the name *Poduridæ*

restricted for the single genus *Podura*. The second section *Entomobryomorpha*, which corresponds to the old *Entomobryidae*, was also split into three; the name *Entomobryidae* was retained for those species possessing the Trochanteral organ, and the rest divided into two new families, *Isotomidae* and *Tomoceridae*. The *Sminthuridae* and *Neelidae* remained as before.

This classification gives us 8 families, and it may seem a large number for so small an order, but there are many districts in the world that have never been searched for springtails, and others in only a haphazard manner, and, doubtless, when the group has been more thoroughly worked, there will be hundreds of new species discovered, which will result in the formation of new genera, and probably of the larger divisions also.

As an example of how a tribe has increased in size and importance in recent years, take the *Cyphoderini*. This tribe for many years contained only the one genus *Cyphoderus*, Nicolet (1842), and that genus, as we know it to-day, contained only two or three species up to the end of the 19th century. Now, as a result of collections made in various parts of the world, there are the additional genera, *Cyphoderodes* of Silvestri (1911), *Pseudocyphoderus*, Imms (1912), the peculiar genus *Calobatella* described by Börner (1913 a). The genus *Cyphoderus* now contains a dozen or more species, with the probability of the number being increased in the near future.

Synopsis of Suborders, Sections, Families, Subfamilies, and Tribes of the Order Collembola, taken from Börner (1913 b), pp. 318-322.

- A. Body flattish-cylindrical, elongated, as a rule distinctly segmented, with free thoracic and free abdominal segments; rarely the abdominal segments 5 and 6 or 4-6 are fused together.

Suborder ARTHIOPLEKSA, C. B., 1901.

1. Tergum of the prothorax similar to the tergum of the other body-segments, always, as in the case of these, possessing some hairs. Furcula present or absent, in the first case lying under abdominal tergum 4. Integument generally granular, mostly soft, seldom with stouter chitinated sclerites. Ventral tube always short, pocket-like, smooth-walled. Manubrium ventrally always without hairs.

Section PODURMORPHA, C. B., 1913.

2. Without pseudocelli. With or without eyes. Sensory organ of the third antennal segment only with sense-rods, without sense-cones, without outer papillae. Fourth antennal segment without subapical sense-pit, always with retractile sense-knob.

1. *Head hypognathous. Eyes situated near the hind edge of the head.* Dentes bowed in the horizontal plane, annulated towards the end, over-reaching the ventral tube. Manubrium in form recalling that of the Symphypleoua, with a special medial support-piece of the dentes.
 1. Family PODURINÆ (C. B.), 1906.
 2. *Head obliquely prognathous.* With or without eyes, these, if present, situated in front of the middle of the head. Dentes not annulated, fairly straight, seldom reaching past the ventral tube, or the furcula more or less completely reduced. When the furcula is present the manubrium is simple in form, without the medial support-piece of the dentes.
 2. Family HYPOGASTRURINÆ (C. B.).
 - i. Mandibles with well-developed molar plate.
Subfamily HYPOGASTRURINÆ, C. B., 1906.
 - ii. Mandibles without true molar plate or absent.
Subfamily ACHORTINÆ, C. B., 1906.
 - * Anal segment with undivided supra-anal valve. With or without furcula.
Tribe PSEUDACHORTINI, C. B., 1906.
 - ** Anal segment with double-lobed broader supra-anal valve.
Without furcula.
Tribe ACHORTINI, C. B., 1906.
 - b. *With pseudocelli.* Without eyes. The sense-organ on antenna III, provided with from 2-3 sense-cones, and often at the same time with outer papillae and protecting bristles, in addition to the sense-rods. Post-antennal organ generally well-developed. Antennal segment 4 generally with subapical sense-pit (= *Lipuride*, Lubbock, 1899¹).
 3. Family OXYCHURIDÆ (Lbk., C. B.).
11. *Tergum of the prothorax always membranous and without hairs.*
Furcula generally present, and in the more recent forms of the group pushed analwards. Integument generally smooth, mostly with seterites. Ventral tube short or elongated, sometimes with a lateral blind sac. Manubria ventrally, generally with hairs or scales, seldom naked.
- Section EXTOMORPHOMORPHA, C. B., 1913.
- a. *Trochanteral organ absent.* Ventral edge of the claw simple, without groove.
 1. Third and fourth abdominal terga of nearly equal length or the 4th longer, sometimes this (the 4th) fused with the 5th and 6th (without scales²). Naked or ciliated sensory setae (= *bothriotriche*) present or absent.
 4. Family ISOTOMIDÆ (Schltr., C. B., 1896-1903)

¹ This should be 1870. Lubbock's "Notes on the Thysanura—Part 4." was published in 1870, not 1869.—J. W. S.

² This is as given by Börner (1913*b*); but, to include the genus *Oncopodura*, Carl & Lebed., it should now read "Scales nearly always absent, when present they are without longitudinal ribs."—J. W. S. 1914.

- i. Head obliquely prognathous. Antennae inserted in the front half of the head. (Tracheae absent.) Furcal segment without chitin-ridges, to which are articulated the basal sclerites of the furcula if these (the chitin-ridges) are present. Furcula seldom absent. Post-antennal organ generally present.

Subfamily ISOTOMINÆ, Schffr., 1896.
(Including the ISOTOMINI, C. B., 1906.)

- ii. Head hypognathous. Antennae inserted in the middle of the head. (Head tracheae present.) Furcal segment with two stout chitin-ridges, which serve for the articulation of the basal sclerite of the furcula.

Subfamily ACTALETINÆ, C. B., 1906.

2. Third abdominal tergum considerably longer than the fourth, all abdominal segments free. With longitudinally ribbed scales. Post-antennal organ absent. Sensory setae present, ciliated. Furcula always present.

5. Family TOMOCERIDÆ (Schffr., 1896).

- i. Dentes annulated; macro diminutive, without hairs. Antennal segments 3 and 4 about equally long.

Subfamily LEPIDOPHORELLINÆ (C. B., 1906.)

- ii. Dentes not annulated, 2-segmented; macro longish, with hairs. Third antennal segment strikingly elongated (this annulated as well as the fourth).

Subfamily TOMOCERINÆ (C. B., 1906).

- b. *Trochanteral organ present* (on the trochanters of the hind legs). Ventral edge of the claws as a rule with basal groove ("split"). Hairs and scales (at least in part) ciliated. Fourth abdominal tergum as a rule considerably longer than the third. Ciliated sensory setae always present. Furcula always present.

6. Family EXTOMOBRYIDÆ (C. B., 1906).

1. Dentes slender, annulated dorsally here and there. Macro small. With or without scales. With or without eyes. Empodial appendage with 4 wing-corners.

Subfamily EXTOMOBRYINÆ (C. B., 1906).

- i. Antenna 4-segmented, with undivided basal segments.

Tribe EXTOMOBRYINI, C. B., 1906.

- ii. Antenna 5- or 6-segmented, with the first or first and second segments secondarily divided into two.

Tribe ONCHESSELLINI, C. B., 1906.

[Here also belongs, presumably, the *Heteromuricea* of Imms, 1912. The medial cercus described by Imms should be nothing else than a peculiarly elongated supranal valve.]

2. Dentes not annulated, not, or only a little, tapered towards the end.

- i. Dentes without dorsal ciliated scales or ciliated spines, dorsally and dorso-laterally (often completely all round) uniformly haired; if dental spines are present, then sometimes they are modified into bristles at the ends of the dentes. Empodial appendage with 4 strong wing-corners.

Macrones plump. Coxæ strikingly short. With or without scales. The hitherto known forms with eyes and free-living. Subfamily PARONELLINÆ (C. B., 1906).

- ii. Dentes with dorsal ciliated scales or ciliated spines, these at the bases of the dentes pass over into ciliated bristles. Coxæ generally distinctly longer than the trochanters (as in *Troglopedetes*?). Empodial appendage with 3 wing-corners, or more or less reduced. Eyeless and scaled.

Subfamily CYPHODERINÆ (C. B., 1906).

- * With one entodorsal row of ciliated spines on the dentes. Free-living in caves.

Tribe TROGLOPETINI, C. B., 1913.

- ** With a double row of ciliated scales on the dentes. Mandibles with or without molar plate. Head obliquely prognathous, or hypognathous. Claws normal or with a bladder-like terminal portion. Mostly living in association with ants or termites.

Tribe CYPHODERINI, C. B., 1913.

- B. Body pear-shaped to almost globular, as a rule, with obsolete segmentation of the thorax and the first 4 abdominal segments; especially the abdominal terga and pleuræ not differentiated. The ano-genital segments remain mostly independent, but are occasionally fused together. Manubrium with a medial support-piece of the dentes, similar to the Poduridæ, ventrally always without hairs. Pronotum (sometimes also the metanotum) without hairs.

Suborder SYMPHYPLEONA, C. B., 1901.

- a. Antennæ inserted in or in front of the middle of the head, always considerably shorter than the head-diagonal, 4-segmented; head without elevated vertex. Corpus tenaculi without bristles. Coxæ elongated, also on the outer side distinctly longer than the trochanteral segment. Ano-genital segment concealed under the furcal segment (seen from above). Abdominal sensory setæ absent.

7. Family NEELIDÆ, Folsom, 1896.

- b. Antennæ inserted behind (over) the middle of the head, generally considerably longer than the head-diagonal, not rarely with subdivided segments. Head with distinctly elevated vertex over the neck. Corpus tenaculi (generally) with bristles. Coxæ not elongated, on the outer side considerably shorter than the inner side and than the trochanteral segment. Ano-genital segment not concealed under the furcal segment. Abdominal sensory setæ present.

8. Family SMINTHURIDINÆ, Lubbock, 1862.

1. Ventral sac (tube) even in full-grown animals smooth-walled (seldom at the tips with small warts—after Linnaeus). Corpus tenaculi with lateral appendage (stylus?) at the base of the rami. Integument granular. Tracheæ (always?) present.

Subfamily SMINTHURIDINÆ, C. B., 1906.

- * Anal and genital segment fused, on each side with two (one small) sensory setæ.

Tribe SMINTHURIDINI, C. B., 1913.

- ** Anal and genital segment separated, sometimes the latter fused with the furcal segment. The genital segment with only one sensory seta.

Tribe KATIAXINI, C. B., 1913.

2. *Ventral sac* (tube) in full-grown animals with *warted walls*. Antennæ always distinctly bent.
 - i. *Antennæ bent between the 3rd and 4th segments*, 4th segment longer than the 3rd, the latter always undivided. Furcal segment without paired dorsal papillæ. Corpus tenaculi at the base of the rami without lateral appendage. Tracheæ present (always?). Genital and anal segment not fused. Subfamily SMINTHERINÆ, C. B., 1906.
 - * Tibio-tarsus at the distal end on the hind side with 2-3 (seldom with a 4th on the front side) more or less closely applied clubbed hairs, not, or only little, over-reaching the claws. With or without empodial appendage. Mucronal bristle absent. Tribe BOULETIELLINI, C. B., 1913.

[Here also belongs the genus *Corynephoris*, Absolon (1907), which is very nearly related to *Boulettiella*, and which only differs by the absence of the empodium and through the dorsal clavate appendage. It is doubtful also whether it possesses tracheæ; abdominal sensory setæ are, however, present in normal numbers.]
 - ** Tibio-tarsus without the described clubbed hairs, having instead sometimes outstanding, finely knobbed, clavate hairs. Mucro with or without bristle. Tribe SMINTHERINI, C. B., 1913.
 - ii. *Antennæ bent between the 2nd and 3rd segments*, 4th always shorter than the 3rd. Furcal segment with one pair of dorsal papillæ. Corpus tenaculi as in 1 (i. e. *Smintthuridinae*). Tracheæ absent (always?). Genital and anal segment fused. Subfamily DICTYROMINÆ, C. B., 1906.

The Genus *Sira*, Lubbock.

In 1870, in his "Notes on the Thysanura—Part 1," Lubbock described several Collembola new to the English Fauna, and one formed the type of a new genus which he called *Sira* (*Seira*). In his monograph, three years later, he described several species under *Sira*, including

S. domestica (Nic.).
S. nigromaculata, Lbk.
S. buskii Lbk.

In later years the genus was split up, and Schött proposed the name *Pseudosira* for types like the *S. domestica* (Nic.), leaving the name *Sira* for those like *nigromaculata* and *buskii*. But this should not be so, for Lubbock expressly states that *domestica* forms the type of his genus *Sira*. Therefore *Pseudosira* must fall and *Sira* take its place, and for the species hitherto included in *Sira*, I propose the new name *Willowsia*¹.

¹ Named after my friend Mr. F. W. Willows, of Tsolo, South Africa.

Genus *SIRA*, Lbk., *mihi*.

Seira, Lubbock (1870), p. 279.
= *Pseudosira*, Schött.

Dentes ventrally covered with scales.

Type. *S. domestica* (Nic.).

Genus *WILLOWSIA*, gen. nov.

Dentes ventrally only with ciliated hairs, without scales.

Type. *W. (Seira) nigromaculata* (Lbk.).

List of Genera of Collembola found in the British Isles.

Class **INSECTA**.

Subclass **Apterygota**, Oudua.

Order **COLLEMBOLA**, Lbk.

Suborder **ARTHROPLEONA**, C. B.

Section **PODUROMORPHA**, C. B.

I. Family **Poduridae** (C. B.).

1. Genus *PODURA*, Linn., Tbg.

II. Family **Hypogastruridae** (C. B.).

Subfamily *HYPOGASTRURINÆ*, C. B.

2. Genus *HYPOGASTRURA*, Bourl., C. B.

3. Genus *XENYLLA*, Tbg.

4. Genus *WILLEMLA*, C. B.

5. Genus —?

A genus comes here related to both *Hypogastrura* and *Xenylla*. I have an English species in my collection, which in many respects is intermediate between these two genera, but so far I have not described it. Possibly it is *Beckerella*, Linnaniemi.

Subfamily *ACHORUTINÆ*, C. B.

Tribe *PSEUDACHORUTINI*, C. B.

6. Genus *PSEUDACHORUTES*, Tbg.

7. Genus *MICRANURIDA*, C. B.

8. Genus *ANURIDA*, Laboulb.

9. Genus *FRIESEA*, D. T.

10. Genus *CHONDROCHORUTES*, Wahlgr.

[The genus *Chondrochorutes* of Wahlgren has not been previously recorded from the British Isles, but it nevertheless occurs there, for I took specimens at Berkhamsted, Herts, in 1910, but have not yet described them.]

Tribe *ACHORUTINI*, C. B.

11. Genus *ACHORUTES*, Templ., C. B.

= *Neanura*, MacG.

III. Family *Onychiuridae* (Lbk., C. B.).

12. Genus *ONYCHIURUS*, Gerv., C. B.

13. Genus *PROTAPHORURA*, Absh., C. B.

14. Genus *TRILBERGIA*, Lbk.

Section *ENTOMOBRYOMORPHIA*, C. B.

IV. Family *Isotomidae* (Schffr., C. B.).

Subfamily *ISOTOMINÆ*, Schffr.

15. Genus *ISOTOMA*, Bourl., C. B.

16. Genus *AGRENIA*, C. B.

17. Genus *PROISOTOMA*, C. B.

17 a. Genus ? *ARCHISOTOMA*, Linnaniemi.

[Linnaniemi has proposed the genus *Archisotoma* for the reception of *Proisotoma besselsi* (= *P. spitzbergensis*, Lbk.), but as I have neither my specimens of *besselsi* nor Linnaniemi's description by me at the moment, I cannot say whether it should be regarded as a separate genus or as a subgenus of *Proisotoma*.]

18. Genus *ANTROPHORUS*, Nic.

19. Genus *FOLSOMIA*, Willm.

20. Genus *TETRACANTHELLA*, Schtt.

21. Genus *ISOTOMODES*, Axels-Linn.

22. Genus *ISOTOMURUS*, C. B.

23. Genus *OXECOPODURA*, Carl & Lebed

Subfamily *ACTALETINÆ*, C. B.

[The subfamily *Actaletine* is not represented in the British Isles.]

V. Family **Tomoceridæ** (Schffr.).

Subfamily **LEPIDOPHORELLINÆ**, C. B.

[The subfamily *Lepidophorellinæ* is not represented in the British Isles.]

Subfamily **TOMOCERINÆ** (C. B.).

24. Genus **TOMOCERUS**, Nic.

24 a. Genus ? **POGONOGNATHUS**, C. B.

[Börner has proposed the genus *Pogonognathus* for the species *Tomocerus* (*P.*) *longicornis* Müll.)

VI. Family **Entomobryidæ** (C. B.).

Subfamily **ENTOMOBRYINÆ** (C. B.).

Tribe **ENTOMOBRYINI**, C. B.

25. Genus **ENTOMOBRYA**, Rond.

26. Genus **SINELLA**, Brook.

27. Genus **LEPIDOCYRTUS**, Bourl.

28. Genus **SIRA**, Lbk., Sblim.

29. Genus **WILLOWSIA**, gen. nov.

Tribe **ORCHESELLINI**, C. B.

30. Genus **ORCHESELLA**, Templ.

31. Genus **HETEROMURUS**, Wankel.

Subfamily **PARONELLINÆ**, C. B.

[The subfamily *Paronellinæ* is not found in the British Isles.]

Subfamily **CYPHODERINÆ** (C. B.).

Tribe **TROGLOPEDETINI**, C. B.

[This tribe has not yet been found in the British Isles.]

Tribe **CYPHODERINI**, C. B.

32. Genus **CYPHODERUS**, Nic.

Suborder **SYMPHYPLEONA**, C. B.

VII. Family **Neelidæ**, Flsm.

33. Genus **NEELUS**, Flsm.

34. Genus **MEGALOTHORAX**, Willem.

VIII. Family *Sminthuridae*, Lbk.

Subfamily *SMINTHURIDINÆ*, C. B.

Tribe *SMINTHURIDINI*, C. B.

35. Genus *SMINTHURIDES*, C. B.

Tribe *KATIANNINI*, C. B.

36. Genus *SMINTHURINUS*, C. B.

37. Genus *ARRHOPALITES*, C. B.

Subfamily *SMINTHURINÆ*, C. B.

Tribe *BOURLETIELLINI*, C. B.

38. Genus *BOURLETIELLA*, Banks, C. B.

Tribe *SMINTHURINI*, C. B.

39. Genus *SMINTHURUS*, Latr., C. B.

40. Genus *ALLACMA*, C. B.

41. Genus *SPHRVOTHECA*, C. B.

Subfamily *DICYRTOMINÆ*, C. B.

42. Genus *DICYRTOMA*, Bourl., C. B.

43. Genus *DICYRTOMINA*, C. B.

44. Genus *PTENOTHRIX*, C. B.

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XLI.—Notes on Fossorial Hymenoptera.—XXVIII. *On new Ethiopian Species of Bembex in the British Museum.* By ROWLAND E. TURNER, F.Z.S., F.E.S.

Bembex obtusa, sp. n.

♂. Nigri; mandibulis, apice excepto, labro, clypeo, fronte macula obliqua nigra utrinque, scapo, orbitis externis, pronoto margine postico, callis humeralibus, prosterno, mesosterno antica, mesonoto linea supra tegulas, scutello linea obliqua utrinque, postscutello margine postico, pedibusque flavis; femoribus anticis supra nigro-linealis, tarsis anticis infra nigro-maculatis; segmento dorsali primo macula transversa utrinque fasciataque transversa mediana angustissima, segmentis dorsalibus 2-6 fascia transversa bisinuata, ventralibus 2-5 macula utrinque, segmento ventrali primo fascia angusta apicali flavo-olivaceis; flagello subtus ochraceo; segmento dorsali sexto apice, septimoque dimidio basali ferrugineis; alis hyalinis, venis fuscis, thorace duplo longioribus.

Long. 21 mm.

♂. Clypeus very broadly triangularly flattened on the apical half, labrum flattened at the base; a strong longitudinal carina between the antennæ; sixth, seventh, and eighth joints of the flagellum each with two or three small spines beneath,

joints 9 and 10 subdenticulate beneath, penultimate joint concave beneath, longer than the tenth, apical joint about half as long again as the penultimate, concave beneath, blunt and rather strongly curved at the apex. Fore tarsi rather stout, with a strong tarsal comb, the apical joint flattened, nearly as broad and less than half as long again as the penultimate, with a small spine on the middle of the outer margin; anterior and intermediate femora not serrate; intermediate tibiae produced into a distinct spine at the apex. Seventh dorsal segment very broad, with parallel sides on the basal portion to beyond the middle, the apex obtuse; the surface of the segment finely punctured, with coarse punctures intermixed near the apex. Second ventral segment with a very large tubercle, which is broadly truncate at the apex; sixth ventral segment with a slightly raised, broadly triangular area near the apex; seventh broad, with a longitudinal carina on each side; eighth produced into a stout blunt tooth. Median cell of the hind wing emitting only one vein from the apex.

Hab. Nyasaland, Mlanje, 2300 ft. (*S. A. Neave*), October.

The apical dorsal segment is shaped somewhat as in the variety of *B. pugillatrix* figured by Handlirsch (*Sitzungsber. Akad. Wiss. Wien*, cii. t. v. fig. 15), but the parallel sides are continued much nearer to the apex than in that figure. In the antennae it approaches *albofasciata*, Sm. (= *karschii*, Handl.), also in the short wings, but differs in the legs and apical abdominal segments. The three intermediate joints of the fore tarsi are moderately dilated, about as broad as long, nearly as much dilated as in *latitarsis*, Handl.

Beabex johnstoni, Turn.

Beabex johnstoni, Turn. *Ann. & Mag. Nat. Hist.* (8) x. p. 372 (1912). ♂.

This belongs to the group of *B. diversipennis*, not of *möbi*, to which I compared it in the description; it is, indeed, probably only an extreme colour-variation of *diversipennis*. In a considerable series of that species from E. Africa the thorax is always without yellow markings in both sexes, except in one female from Harar. The yellow markings on the abdomen vary much, but do not form continuous fasciae as in most West-African specimens. The wings are hyaline in the male, more or less strongly fuscous at the base in the female in all specimens which I have seen.

Bembex albidula, sp. n.

♂. Niger; abdomine cæruleo-tincto; mandibulis, apice excepto, labro, clypeo macula magna basali nigra utrinque, scapo subtus, orbitis, macula parva utrinque sub ocellis, prosterno, callis humeralibus apice, segmento mediano angulis posticis, segmentis dorsalibus 2-4 fascia late interrupta, primo macula magna utrinque, quinto fascia anguste interrupta, sexto linea transversa utrinque, segmentis ventralibus secundo tertioque macula parva utrinque, femoribus anticis intermediisque subtus, tibiis supra nigro-lineatis, tarsisque anticis intus albidis; alis hyalinis, venis fasciis, antice latitudine thoracis duplo et dimidium longiores.

Long. 22 mm.

♂. Eyes distinctly divergent towards the clypeus; labrum flattened, clypeus convex; carina between the antennæ very low. Antennæ almost normal; eighth joint of the flagellum with two very minute spines beneath; ninth with a minute spine near the base; apical joint slightly curved, rounded at the apex, longer than the penultimate. Fore tarsi moderately stout, the joints not dilated; the basal joint with seven spines, the basal spine small. Fore and intermediate femora unarmed, intermediate tarsi simple, intermediate tibiae not produced at the apex and without a long apical spur. Seventh dorsal segment subtriangular, narrowly rounded at the apex, closely punctured at the base, sparsely at the apex. Second ventral segment with a small tubercle near the apex; sixth produced into a stout blunt tooth at the apex; seventh unarmed, without carinæ; eighth in the form of an acute spine. Median cell of the hind wing emitting two veins from the apex.

Hab. Sierra Leone, Mussaia (*J. J. Simpson*), April.

This fine species is somewhat intermediate between *diversipennis* and *monedula*, but seems to belong to the group of the latter, though distinguished from it by the spines on the eighth and ninth joints of the flagellum, and by the much narrower seventh dorsal segment. Handlirsch, in giving the distinguishing characters of the group, says "*Mittelschenkel gezähnt*," but in describing the species says "*femoribus intermediis infra non dentatis*." The latter statement is correct.

B. ugandensis, Turn., is also near this species, but differs in the structure of the antennæ, the hollow grooves beneath the three apical joints being well marked in *ugandensis* and almost obsolete in the present species, the spines on the other joints are also different. The colour-differences, though great and apparently constant locally, cannot alone be relied on in this group.

Bembex odontopyga, sp. n.

♂. *Niger*; mandibulis, apice excepto, labro, clypeo macula basali nigra utrinque, scapo subtus, orbitis, femoribus, tibiisque subtus, tarsisque flavis; flagello subtus obscure brunneo; segmentis dorsalibus 2-4 fascia angusta late interrupta, quinto sextoque fascia continua, septimo macula obliqua utrinque, segmentisque ventralibus 2-5 fascia angusta continua apicali brunneo-flavis; segmentis dorsalibus obscure cæruleo-micantibus; segmento septimo dorsali apice fusco-ferrugineo; alis hyalinis, venis fuscis. Long. 19 mm.

♂. Clypeus with a carina from the base to beyond the middle, deflexed from the end of the carina to the apex, not very strongly convex; the carina between the antennæ very distinct. Four apical antennal joints distinctly hollowed beneath, stout, the apical joint blunt at the apex, a little longer than the penultimate. Head, thorax, and median segment clothed with long whitish pubescence, that on the mesonotum shorter and brownish. Fore tarsi normal, the basal joint with seven spines; fore and intermediate femora not serrate. Median segment with a very feeble longitudinal groove. Seventh dorsal segment with a short spine on each side near the base, the apex rather broadly truncate, not undulating at the sides. Ventral segments unarmed. Wings about two and a half times as long as the breadth of the thorax; median cell of the hind wing emitting two veins from the apex. The eyes are distinctly divergent towards the clypeus.

Hab. Nyasaland, Ngara (*Dr. J. E. S. Old*), October.

This belongs to the *bidentata* group, and apart from colour-differences may be distinguished from *môbi* by the absence of a strong tooth at the apex of the intermediate femora; from *bidentata* by the more distinct carina of the clypeus, by the colour of the pubescence, and by the broader apex and less developed teeth of the seventh dorsal segment. *B. scotti*, Turn., the only remaining African species of the group, may be at once distinguished from this by the much finer and sparser puncturation of the thorax and median segment. In colour *odontopyga* resembles *compedita*, Turn., which is allied to *juscipennis*.

Bembex forcipata, Handl.

Bembex forcipata, Handl. Sitzungsber. Akad. Wiss. Wien, cii. p. 793 (1893). ♂.

Bembex massaiica, Cameron, Sjöstedt, Kilimandjaro-Meru Exp. ii. p. 260 (1910). ♂.

Bembex liturata, sp. n.

♂. Niger; labro albedo, basi macula longitudinali brunnea; mandibulis, apice excepto, clypeo fascia transversa basali nigra, scapo subtus, orbitis, pronoto margine postico, propleuris callis humeralibus, mesosterno antico, tegulis macula, linea supra tegulas, scutello margine postico, pedibusque flavis; tibiis supra nigro-lineatis; segmentis dorsalibus sex basalibus fascia flavo-olivacea; segmentis ventralibus primo apice, secundo fascia lata transversa, 3-6 macula utrinque flavis; alis hyalinis, venis fusco-ferrugineis.

♀. Mari similis, clypeo dimidio basali nigro; segmento mediano macula parva utrinque flavo; segmento ventrali secundo dimidio apicali brunneo-ferrugineo, utrinque flavo-maculato.

Long., ♂ 17, ♀ 15 mm.

♂. Clypeus strongly convex; inner margin of the eyes almost parallel; no carina between the antennæ; seventh joint of the flagellum emarginate at the apex beneath, eighth with a small spine beneath, ninth and tenth stout, penultimate joint much broadened, longer than the subconical apical joint. Tarsi slender, the spines of the comb of the anterior tarsi slender; intermediate femora very feebly serrate. Seventh dorsal segment very broadly rounded or subtruncate at the apex, with a marginal carina on each side near the base. Second ventral segment with a strong tubercle, which is rounded at the apex; sixth with a large raised semicircular area. Wings rather short, only twice as long as the breadth of the thorax; median cell of the hind wing emitting only one vein from the apex.

♀. Basal joint of the fore tarsus with seven spines; sixth dorsal segment broadly triangular, very sparsely punctured in the middle, more coarsely and closely on the sides; second ventral segment shining in the middle, with large sparse punctures.

Hab. S. Africa, Willowmore (*Dr. H. Brauns*), December.

The male genitalia are not strongly curved as in the *melanopa* group, the relationship being rather with the *mediterranea* group.

Bembex opina, sp. n.

♂. Niger, clypeo, mandibulis, apice excepto, labroque albo-flavido; flagello subtus brunneo-ferrugineo; scapo, supra nigro maculato, orbitis, pronoto postice, callis humeralibus, tegulis, mesonoto linea supra tegulas, scutello margine postico, postscutello margine postico, segmento mediano fascia angusta apicali, segmento dorsali primo dimidio apicali, secundo antice nigro bisinuato, 3-6 omnino, segmentis ventralibus 2-5 lateribus et

margine apicali, pedibusque flavis; alis hyalinis, venis fusco-ferrugineis.

♀. Mari similis; macula flava sub ocellis, segmento dorsali secundo flavo, macula parva nigra utrinque, 3-5 basi anguste nigris, sexto nigro macula flava apicali utrinque; alæ anticæ thoracis latitudine duplo et dimidium longiores.

Long., ♂ ♀, 16 mm.

♂. Clypeus strongly convex, labrum flattened, no carina between the antennæ; seventh, eighth, and ninth joints of the flagellum spined beneath, apical joint curved, truncate at the apex, no longer than the penultimate. Anterior femora unarmed, intermediate femora very obscurely serrate; anterior tarsi normal, the basal joint with six spines; intermediate tibiæ and tarsi normal. Second ventral segment with a strong tubercle acute at the apex; sixth ventral segment with a slightly raised triangular area; seventh dorsal segment closely punctured, narrowly rounded at the apex, the sides with short, stiff, black pubescence. Median cell of the hind wing emitting two veins from the apex, the lower vein ill-defined. Head and thorax thickly clothed with grey pubescence.

♀. Middle of the second ventral segment shining, with deep sparse punctures; sixth dorsal segment subtriangular, very narrowly rounded at the apex, closely punctured, with stiff setæ on the sides, subcarinate longitudinally in the middle.

Hab. S. Africa, Willowmore (*Dr. H. Brauns*), January and February.

The seventh ventral segment of the male has a median longitudinal carina.

This seems to be nearest to *capicola*, Handl., though differing in the armature of the ventral segments of the male, the shape and sculpture of the seventh dorsal segment, and in other smaller details.

XLI.—On *Fabricius's Types of Odonata in the British Museum* (*Natural History*). By HERBERT CAMPION.

AS far as I am able to ascertain, the British Museum Collections include fourteen Dragonflies which have been described or determined by Fabricius. All but two of them came in Sir Joseph Banks's Collection of insects, which was presented by the Linnean Society in 1863. Although the welfare of

the collection necessitated its removal from the large and ornate cabinet in which it was then contained, it has fortunately remained intact and separate from the main collections of the Museum.

With regard to the identification-labels relating to these historical specimens, an attempt has been made to determine, by the character of the handwriting itself, whether Fabricius was the author of all or any of them. Through the good offices of Mr. J. H. Durrant I have been able to examine the caligraphy of two holograph letters written by Fabricius in Paris in 1805. Although both were produced in the same year, there is a considerable difference between them in style and even in the formation of letters—a fact which makes it all the more difficult to distinguish Fabricius's hand from other writing of the same period. At the same time, these labels are in two different styles of writing, at least, and the two styles may even be detected upon the same label. Nevertheless, I think it may be assumed that most, if not all, of the drawer-labels in the Banks Collection are the work of Fabricius himself. The case of the pin-labels in the General Collection is much clearer, as they correspond exactly, both in form and caligraphy, with the labels attached to certain undoubted Fabrician types of Coleoptera to which Dr. C. J. Gahan has kindly called my attention.

I. SPECIMENS IN THE BANKS COLLECTION.

The twelve Banksian dragonflies, which nominally represent as many species, are in a fair state of preservation, and, with the exception of those labelled *Libellula carolina*, *Æshna grandis*, *Agrion virgo*, and *A. linearis*, are the types of species described by Fabricius at various dates. Five of these are the types of nominal species merely, the valid species represented by their types being *Libellula* [*Neurothemis*] *stigmatizans*, *L.* [*Rhyothemis*] *notata*, and *Agrion* [*Sapho*] *ciliata*. Certain other types referred to by Fabricius as being in the Banksian Collection are not now to be found there, and I am unable to learn anything concerning their fate. The missing insects are *Libellula bifasciata* (= ? *Libellula lydia*, Drury, ♀), *L. variegata* (= *Palpopleura lacu*, Drury, ♀), and *Æshna variegata*. As regards the last-named, the British Museum register of accessions expressly mentions *Æshna variegata*, from Tierra del Fuego, as being in the Banksian Collection at the time of its acquisition by the Museum (1863). In 1887 McLachlan knew of its disappearance, and wrote, "In order to save disappointment,

I state that it no longer exists in Mus. Banks, and has probably been long ago destroyed" (Ent. Mo. Mag. xxiv. p. 77). It is unlikely now that the obscurity which surrounds the identity of this species, as well as the history of the type, will ever be cleared up.

No fewer than five of the specimens under consideration have obviously incorrect habitats assigned to them in Fabricius's writings. These are *Libellula equestris* (= *Neurothemis tullia*, Drury), *L. ferruginata* (= *Crocothemis servilia*, Drury), *Æshna grandis* (= *Æschna cyanea*, Müll.), *Agrion ciliata* (= *Sapho ciliata*, F.), and *A. linearis* (= *Mecistogaster linearis*, F.). Of course, lapses of this description were not at all infrequent at a time when little or no importance was attached to the facts of geographical distribution.

Below each insect stands a large oblong drawer-label, with a double black border, bearing the name of the genus and species, as well as a reference to the published description. The labels applying to *Libellula stigmatizans*, *L. oculata*, and *L. carolina* have a portion of the reference printed in—i. e., "Fab. Entom. p." in the case of the two first-named, and "Gunn, S. N. p." in the case of the last-named. The only pin-labels of any description are four tickets marked with the British Museum registration number, and five modern-looking tickets bearing the name of the reputed country of origin. Three manuscript genus-labels, dividing the collection into the genera *Libellula*, *Æshna*, and *Agrion*, may also be of post-Fabrician date.

In considering the specimens *seriatim*, Fabricius's original diagnosis of each of the eight types may be usefully quoted, but for our present purposes his more detailed descriptions need not be consulted, and will therefore be omitted.

- (1) *Libellula stigmatizans*, F. ♀. Type.
(= *Neurothemis stigmatizans*, F., ♀.)

Labels:—"Libellula stigmatizans Fab. Entom. p. 421, n. 5"; square white ticket, "Australia," printed; round blue ticket, "83"
47

Diagnosis:—"L. flavescens, alis macula apiceque fuscis: stigmatum nivo. Habitat in nova Hollandia. Mus. Bankianum."—F., Syst. Ent. p. 421, no. 5 (1775).

This specimen and the next were examined by De Selys, and were identified by him as the ♀ and ♂ respectively of a single species (Ann. Mus. Civ. Gênes, xiv. pp. 292, 293; 1879). Although he adopted the name of the ♂ (*oculata*) as that of the species, the modern rule respecting page-

locality, however, is manifestly a wrong one, as Fabricius's type clearly belongs to the Asiatic form *Crocothemis servilia*, Drury, 1773. This is shown by the abdomen, which is parallel-sided and devoid of mid-dorsal black spots, and by the wings, which are narrow and rather smoky at the tips. The abdomen measures 27.5 mm. and the hind wing 34 mm. There are $11\frac{1}{2}$ antenodals in each fore wing. Drury's figure of *Libellula servilia*, from China (Ill. Ex. Ent. i. pl. xlvii. fig. 6; 1770), agrees fairly well with the type of *L. ferruginata*, the main points of difference being that the abdomen is too long and that the coloured area at the base of the fore wings is too large. In 1793 (Ent. Syst. ii. p. 380) Fabricius treated his *L. ferruginata*, as well as *L. servilia*, Drury, as synonyms of his *L. ferruginea*. In the original description of *L. ferruginea*, 1775, the habitat was given as "America," but in 1793 the habitat was changed to "China."

(8) *Libellula carolina*, Linn. ♂.
(= *Tramea virginia*, Ramb.)

Label:—"Libellula carolina Linn. S. N. p. 504. n. 17."

The base of the abdomen is in poor condition, the contents having apparently been eaten out by mites, and the hamules have disappeared. Nevertheless, the character of the basal spot in the hind wing is sufficient to show that the insect is not the North-American *Tramea carolina*, Linn., but the Chinese species now known as *Tramea virginia*, Ramb. This Chinese species is usually referred to as *Tramea chinensis*, De Geer, but, as a case of homonymy is involved, Dr. Ris (C. H. Selys, Libell. fasc. xvi. (1) p. 978; 1913) has recently restored to it Rambur's name of *virginia*. Re-examination of Rambur's type has revealed its Asiatic origin, notwithstanding that author's erroneous citation of its habitat as "Amérique septentrionale" (Ins. Névr. p. 34; 1842).

(9) *Æshna grandis*, Linn. ♂.
(= *Æshna cyanea*, Müll.)

Label:—"Æshna Grandis Fabr. Sp. Ins. No. 2."

Reference:—"A. thorace lincis quatuor flavis, corpore variegato. Habitat et in Insulis Sandwichii Mus. Dom. Banks"—F., Mant. Ins. i. p. 339, no. 2 (1787).

In this passage, which is quoted *in extenso*, Fabricius proposes to extend the distribution of *Æ. grandis*, as given in his earlier writings, so as to include the Sandwich Islands. The locality is not repeated in Fabricius's list of 1793, and

is, of course, entirely erroneous. The insect is, in fact, a ♂ of the common European species *Eschna cyanea*, Müll., which was not recognized as a distinct species until 1764. It seems to have been confused by many of the older entomologists with *E. juncea*, Linn., or even, as in the present case, with *E. grandis*, Linn.

- (10) *Agrion ciliata*, F. ♀. Type.
(= *Sapho ciliata*, F.)

Labels:—"Agrion ciliata Fabr. Sp. Ins. No. 3"; round blue ticket, "63"
47"

Diagnosis:—"A. viridi ænea, abdomino fusco, pedibus ciliatis nigris. Habitat in Coromandel. Mus. Dom. Banks."
—F., Spec. Ins. i. p. 528, no. 3 (1781).

Concerning this specimen De Selys wrote thus:—"J'ai reconnu notre espèce dans l'exemplaire type de l'*Agrion ciliatus* mâle, de Fabricius, qui existe encore heureusement dans la collection de Joseph Bancké, déposée à la Société Linnéenne de Londres. Dans ses ouvrages, Fabricius indique par erreur *Coromandel* comme la patrie du *ciliatus*, mais j'ai examiné avec soin l'exemplaire type sous le rapport de la réticulation, et je me suis assuré qu'elle est en tout conforme à celle des individus de *Sierra Léone*" (Monogr. Calopt. p. 60, 1854). Fabricius's type, however, is not a male, as stated by De Selys, but a small example of the female sex. The abdomen is 41 mm. in length and the hind wing 37 mm.

- (11) *Agrion virgo*, Linn. ♂.
(= *Calopteryx splendens*, Harr.)

Label:—"Agrion Virgo Fabr. Sp. Ins. p. 526. n. 1."

This is the common European species *Calopteryx splendens*, Harr., which was regarded by Linnæus as merely a form of *C. virgo*. Fabricius apparently adopted the same view, and never recognized Harris's action in 1782 in separating the two forms specifically.

- (12) *Agrion linearis*, F. ♂.
(= *Mecistogaster linearis*, F.)

Label:—"Agrion Linearis Fabr. Sp. Ins. No. 5."

This specimen is not the type, the species having been described in 1776 from material in the possession of Dr. Fothergill. The type cannot now be traced, and in its absence it is impossible to say precisely what Fabricius's species may be.

In 1781 he identified it with *Mecistogaster lucretia*, Drury, and some colour is lent to this identification by the fact that both species were described from Fothergill's collection. Drury stated that his *lucretia* came from the Cape of Good Hope, while Fabricius gave India as the habitat of his *linearis*; but, of course, *Mecistogaster* is exclusively a Neotropical genus. Whatever may be the identity of the Fabrician type, the species in the Banks Collection is quite distinct from that figured by Drury. The specimen before us was examined by De Selys, and referred by him to the species which he described as *M. linearis*, F. (Bull. Acad. Belg. (2) x. p. 22, 1860). A note appended to that description may be usefully quoted here:—"L'exemplaire de la collection Banks à Londres, qui passe pour avoir été étiqueté par Fabricius, est un mâle de cette espèce, à ptérostigma brun (semi-adulte). Les figures de Drury et de Sulzer, citées à l'appui dans l'*Entomologia systematica*, sont au contraire la *lucretia*. Quant à la description de Fabricius, elle peut s'appliquer aux deux espèces. Si l'on devait prendre le *linearis* de Fabricius pour synonyme de *lucretia* (nom plus ancien), il faudrait adopter pour notre espèce *linearis* le nom de *tullia*, de Burmeister."

II. SPECIMENS IN THE GENERAL COLLECTION OF THE BRITISH MUSEUM.

In 1793 (Ent. Syst. ii.) Fabricius referred to three dragonflies in the British Museum Collection. These were *Libellula trimaculata*, De Geer (= *L. lydia*, Drury), p. 374, no. 3; *L. sinuata* (= *Palpopleura lucin*, Drury), p. 378, no. 17; and *L. vibrans*, p. 380, no. 30. The first is involved in much obscurity, and the second has not been traced at all, but *L. vibrans* has been identified with certainty. Unlike the Banksian insects, the two Fabrician specimens now in the General Collection carry a plain buff pin-label, with the two upper corners cut off, and bearing the name of the species in Fabricius's handwriting.

- (1) *Libellula lata*, F. ♀.
(= *L. lydia*, Drury, ♀.)

Label:—"Libellula lata Fab."

Apparently this name was never published, and the only reference to it which I can find is one contained in an interleaved and annotated copy of Linnaeus's '*Systema Nature*' (ed. xii.). This book is preserved in the British Museum

(Natural History), but the authorship and date of the supplementary descriptions with which it abounds are unknown to me. Several manuscript additions to the genus *Libellula* have been made, and among them is the following:—

“lata. LIB. alis planis hyalinis fascia maculaque baseos nigro-fusca, abdomine carinato glauco.
Mser.*
Hab. in Pennsylvania, Marylandia, Carolina.”

These words, however, while agreeing sufficiently well with the male of *L. lydia*, do not apply to the Fabrician specimen, which is a female of that species.

There seems to be some reason for believing that *Libellula bifasciata*, F., usually identified with *L. pulchella*, Drury, may be, in reality, the ♀ of *L. lydia*, Drury. The last-named insect is very different in its wing-markings from its corresponding ♂, which is undoubtedly the *L. trimaculata* of De Geer and Fabricius, but is very like *L. pulchella*, and especially the ♀ of that species. It is true that in 1793 Fabricius identified his *L. bifasciata*, 1775, both with Drury's figure of *L. pulchella* and also with Petiver's figure (Gazophylacium, i. pl. xv. fig. 2) of what is clearly intended for *L. lydia*, ♀. This is, however, evidently a case of confusion, due to the similar appearance of the two insects, and the difference in size was overlooked. But it is a very significant fact that Fabricius compares both *bifasciata* and *trimaculata*, in respect of build and size, with *L. depressa*, Linn., and it may be more natural to look upon them as the ♀ and ♂, respectively, of the same species, *L. lydia*, than to regard *bifasciata* as *L. pulchella*, which is decidedly larger than *L. depressa*, and *trimaculata* as *L. lydia*, ♂, which is rather smaller than *L. depressa*.

The fact that the specimen under consideration undoubtedly belongs to *trimaculata*, and is the only one of the kind in the British Museum which possesses any label in Fabricius's handwriting, would lead one to suppose that it is really the type of his description of that species. But this view of the matter seems to be negatived, both by the description itself, and by the two figures (De Geer, Mém. Ins. iii. pl. xxvi. fig. 2, and Petiver, Gazoph. i. pl. xv. fig. 1) cited in illustration of it, all of which apply to the male sex alone.

(2) *Libellula vibrans*, F. ♀. Type.

Labels:—“*Libellula vibrans* Fab.”; “Georgia.”

Diagnosis:—“*L. alis planis albis; macula media atra*

apicibusque ferrugineis. Habitat — — Mus. Britann."—F., Ent. Syst. ii. p. 380, no. 30 (1793).

Although Fabricius did not indicate any locality for this type, it nevertheless carries a small round label inscribed "Georgia." The fact that the written surface of the label had been placed in direct contact with the pectus of the dragonfly no doubt led to its being overlooked. The specimen is in an unusually good state of preservation, and the measurements are as follows:—Abdomen 39.5 mm., hind wing 49 mm., pterostigma 7 mm. In the fore wings the triangles are 3-celled, the subtriangles are 6-celled, and the antenodals number from $16\frac{1}{2}$ to 18. At the base of each wing a dark line in the subcostal space reaches nearly to the third antenodal. The nodal spot on all wings is small, and no markings of any kind lie between that spot and the pterostigma. The brown apical cloud on all wings is small, not reaching inwards much beyond the distal end of the pterostigma.

XI.III.—*A new Vole from Palestine.*

By OLDFIELD THOMAS.

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IN 1913 the British Museum received as a donation from Mr. N. Charles Rothschild six voles from Ekron, south-east of Jaffa, and these were provisionally put down as *Microtus syriacus*, Brants.

Inquiry was, however, made of Prof. Matschie as to certain details of the type of that species, and with the help of his account I am now able to recognize that the Ekron vole is distinct and should be described as new.

Microtus phillistinus, sp. n.

Like *M. lydius*, Blackler, but bullæ larger.

Size and general colour above quite as in *M. lydius*, the back sandy brown, rather more buffy than Ridgway's "buffy brown." Sides more buffy, but not so strongly as in *lydius*. Under surface washed with buffy, more so than in *lydius*, in which the ends of the hairs are greyish white, less so than in *quentheri*. Hands and feet buffy fawn. Tail as long as in *lydius*, longer than in *quentheri*; its upper surface terminally distinctly blackened, which is not the case in *lydius*; its lower surface pale buffy—white in *lydius*.

Skull and teeth like those of *M. lydius*, with the important exception that the bullæ, although unusually variable in size, are conspicuously larger in most specimens and slightly larger in all. Height from crown to molars markedly less than in *M. hartingi*.

Dimensions of the type:—

Head and body 125 mm.; tail 33; hind foot 20.

Skull: condylo-incisive length 29.7; zygomatic breadth 16.5; nasals 8.2×3.9 ; length of brain-case from postorbital angle backwards 13.6; palatilar length 14.8; diastema 9; palatal foramina 5.5; length of bulla from front of par-occipital process in a straight line forwards 8.5; upper molar series (crowns) 6.9.

Hab. Ekron, S.E. of Jaffa, Palestine.

Type. Adult male. B.M. no. 14.1.16.1. Collected 1st December, 1913, by T. Aharoni. Presented by the Hon. N. C. Rothschild. Six specimens.

From *M. guentheri*, Duf. & Alst., this species is distinguished by its longer tail, and from *M. lydius* by the various characters above enumerated, notably by its larger bullæ.

With regard to the two voles from Palestine described long ago by Brants & Wagner, "*Hypudæus syriacus*" and "*Hypudæus cinerascens*," the latter is soon disposed of, as it is clearly a hamster (*Cricetulus*), and not a vole at all. Mr. Aharoni has sent examples from Jaffa agreeing with the description in every detail.

Microtus syriacus, from the Lebanon (*vide* Matschie), is said to be a greyish, not a sandy-brown, species, and the accounts of the type sent me by Prof. Matschie show it to have been smaller than *M. philistinus* (upper tooth-row 5.7 mm., diastema 6.9), and to have been apparently of a different group of voles. For he says of the teeth that m_1 has only seven spaces, with four projecting angles on its outer side, numbers never found in the present group, in which nine spaces and five outer angles always occur.

Whether *M. syriacus* may prove to be a young *Chionomys* or some totally different form of vole, still remains to be seen. Both Brants and Matschie have been struck by the unusual length of its whiskers, the longest of which measures 36.5 mm. Those of *M. philistinus* are of quite moderate length.

I have provisionally used a binomial for the Ekron vole, but think it probable that it may grade into *M. lydius* and *guentheri*, the latter the earliest described of the group.

XLIV.—On the small Hamsters that have been referred to *Cricetulus phæus* and *campbelli*. By OLDFIELD THOMAS.

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THE small unstriped Hamsters with naked soles, which occur over an area ranging from the Crimea, Asia Minor, and Palestine on the west to the Altai, Kashghar, and Ladak on the east, have all been either referred to one species, called *phæus*, or occasionally split up into several on size, a character that proves most illusory. Both their nomenclature and characters still remain in much confusion.

Firstly, I regret to say that the name *phæus* does not stand for any of them, as it is antedated by an earlier term.

In 1773* Pallas described, of this group, the species *migratorius* (type-locality: R. Ural, S.W. of Orenburg), *sungorus*† (R. Irtysh, Siberia), *arenarius* (Irtysh), and *barabensis* (Irtysh), the first and fourth of which he changed in the 'Gires'‡ to *accedula* and *furunculus*, while he added to them *phæus* (type-locality: Lower Volga, near Sarepta). By a curious fatality, not unusual in nomenclature, this name, the latest of all, got complete dominance over the others, and has been universally used to the present time. No doubt the wide utilization of Pallas's well-known 'Gires' was the cause of the mistakes involved.

Putting aside *sungorus* and *barabensis* (*furunculus*) as not of the "*phæus*" group, we may first accept without hesitation Dr. Satunin's opinion§ that *accedula* (i. e. *migratorius*) is the same as *phæus*, both being from the same region of Southern Russia. This acceptance, however, involves the use of the senior name, *migratorius*, and the consequent disappearance of *phæus*. Dr. Satunin also considers *arenarius*, from the Irtysh, as the same species.

On laying out the whole Museum series assigned to "*phæus*," rather more than 80 in number, I find that while the Central Asiatic forms are, as a general rule, larger, with larger teeth and longer hair than those from the west, yet that both skull and teeth vary in series of each form to such an extent as to overlap each other. I therefore provisionally

* Reise, ii. pp. 703-704 (1773).

† *Sungorus* cannot be treated as a misprint for *sungarus*, as has commonly been done, for it not only occurs both in text and plate, but is also used in the same form for another animal on p. 730.

‡ P. 86 (1773).

§ Mittheil. Kaukas. Mus. ii. p. 340 (1906).

combine them all (except a set from Ladak) as one species, which, as shown above, should bear the name *migratorius*.

The status of the Grecian form, *Cricetulus atticus*, and that of Palestine, to which the name *cinerascens** applies, I do not propose at present to discuss, but I confess I doubt very much if either of them deserves specific distinction from *C. migratorius*.

Putting aside these, the subspecies of *C. migratorius* which may be recognized appear to be as follows:—

C. migratorius migratorius, Pall.

Synn. *accedula*, Pall., *phæus*, Pall., *eversmanni*, Brandt.

Type-locality. R. Ural.

Range. S. Russia, Caucasus region, Transcaspia, Persia, and Asia Minor south of the coastal forest-region of the north-east.

Size comparatively small; skull about 27 mm. in length, its upper tooth-row 4 mm., the teeth themselves narrow and light. Fur short, hairs of back about 9 mm. in length. Colour above pale grey, generally with indistinct median darker dorsal shading. Hairs of under surface with grey bases, except that they are wholly white on an area on the throat, which extends in a median point down to between the fore legs.

C. migratorius vernula, subsp. n.

Type-locality. Khotz, near Trebizond.

Range no doubt all the forest coastal strip along the south-east corner of the Black Sea.

Size averaging slightly larger than in true *migratorius*. Fur of back 8-9 mm. in length. Colour darker throughout, the upper surface near "mouse-grey," the median dark dorsal area faintly evident. Hairs of under surface with a shorter length of white above the slaty, and the white itself not so pure, but faintly suffused with buffy; white throat-area less extended towards the chest, ending about halfway towards the fore limbs. Ears with proecote markedly blackish. Tail distinctly darker above, at least for its basal half.

Dimensions of type:—

Head and body 115 mm.; tail 32; hind foot 17; ear 17.5.

Skull: greatest length 28.2; condylo-incisive length 26; palatal foramina 5; upper molar series 4.2.

* *Hypodæus cinerascens*, Wagn. Wieg. Arch. 1818, p. 184.

Type. Adult female. B.M. no. 6.5.1.83. Original number 2443. Collected 25th February, 1906, by A. Robert. Presented by Oldfield Thomas. Seven skins and six specimens in spirit.

A darker and more saturate race of *C. migratorius*, a variation which occurs in other forms from the same district. Its range eastwards into Trans-Caucasia remains to be worked out, but a specimen in spirit from the Talysch Mts. appears to be very similar to it. To the south, a specimen from "60 miles north of Erzeroum" (*Woosnam*) would also seem to be referable to the same species.

C. migratorius arenarius, Pall.

Type-locality. Báraba Steppes, Lower Irtysh, Siberia. Southwards to Lake Balkhash.

Under surface wholly white, the hairs white to their bases.

A spirit-specimen from Mt. Bek Danata, north of Lake Balkhash (*W. Bateson*), has head and body 94 mm., tail 26, hind foot 15. Its skull measures 28.5 mm. in total length, its tooth-row 4.2 mm.

The Museum only contains the above-mentioned spirit-specimen, whose agreement with Pallas's description as to the whiteness of the under surface leads me to assign it to the true *arenarius*, and to consider the next form, of which we have a large number of specimens, as distinct.

C. migratorius griseiventris, Sat.

Type-locality. R. Bis-shen-gol, Altain-nuru, Gobi Altai.

Range. Central Asia. Samarkand and eastwards along the Thian Shan, filling up the area between the ranges of *arenarius* and *fulvus*.

Size averaging larger and teeth heavier than in the western forms. Fur longer—hairs of back 10 mm. or more. General colour above pale grey, more or less strongly suffused with buffy or fulvous. Under surface with the hairs snowy white to the bases on throat and inguinal region, but broadly slaty at base on the belly.

A male from Djarkent measures:—Head and body 120 mm.; tail 27; hind foot 16. Skull: greatest length 30; upper tooth-row 4.5.

Of this form the Museum possesses a fine series from Djarkent, collected by W. Rückbeil, besides specimens from Samarkand, Dzungaria, Hami and elsewhere in the Carruthers collection. It differs from *C. m. arenarius* by the presence of broad slaty bases on the belly hairs.

C. migratorius fulvus, Blanf.

Type-locality. Kashgar.

Range between 35° and 41° N., 74° and 80° E., so far as our specimens show, but probably extending considerably further, especially towards the east.

Like *C. m. griseiventris* in all respects except that the general colour is a little paler; the white of the under surface passes higher up on the sides, and is less modified by slaty bases, which are only present, and then very inconspicuously, on the centre of the belly.

Mr. Holmes-Tarn collected some specimens of this beautiful little Hamster on the Karakash River, Chinese Turkestan, and Mr. Carruthers an example on the north side of the Karakoram Mts. The original specimens were obtained during the Yarkand Mission, and the type is in Calcutta.

Subspecies *fulvus* and *griseiventris* are no doubt very closely allied, but may apparently be distinguished by the darker colour and greater amount of slaty on the belly of the latter.

In the nearly or quite pure white belly *fulvus* agrees with the typical *arenarius* of much further north, though the two appear to be separated by the range of *griseiventris*. Specimens from many further localities will be needed before the exact relations of the three can be determined.

Although I provisionally accept Dr. Satunin's view as to the Central Asian Hamsters belonging to the same species as *C. migratorius*, I think it not improbable that they really ought to be divided into two species—a small-toothed one, of which *migratorius* and *vernula*, and perhaps *arenarius*, would be subspecies; and a large-toothed Asiatic one, consisting of the subspecies *fulvus* and *griseiventris*.

But the following animal must in any case be distinguished as a species:—

Cricetulus alticola, sp. n.

General characters and colour above about as in *C. m. fulvus*, but the hairs of the under surface broadly slaty at base, even on chest and throat, those of the chin being alone white to their roots. Ears grey, not darkened on the pre-ecote. Tail heavily haired, wholly white.

Skull distinguished from that of all forms of *C. migratorius* by its conspicuously smaller bulle, small both vertically and horizontally. Palatal foramina comparatively long, parallel-sided.

Dimensions of type (measured in the flesh):—

Head and body 98 mm.; tail 31; hind foot 15·5; ear 15.

Skull: greatest length 27; condylo-incisive length 24; palatilar length 11·3; palatal foramina 5·5; breadth of bulla at right angles to its greatest diameter 3·3; upper tooth-row 3·9.

Hab. Ladak. Type from Shushal, 13,500'; other specimens from Durgu Vil and Khardiong (*Crump*), and Teza, Upper Sutlej Valley (*Whitehead*).

Type. Adult male. B.M. no. 6. 10. 3. 13. Original number 115. Collected 29th June, 1906, by C. M. Crump, and presented to the National Museum by Col. Ward. Four specimens in all.

This Hamster has a quite extraordinary resemblance to the pale-coloured Voles of the genus *Alticola* (e. g., *A. stracheyi*, *cricetulus*, or *phasma*), with which it agrees in proportions, length and colour of fur, and external appearance generally; it even has, unlike *C. migratorius*, their slaty-based throat-hairs. In fact, the only points that show it is not a Vole are the shorter and more "pudsy" feet and the finely-haired untufted ears—neither of which affect the general appearance.

C. m. fulvus is also very like *Alticola phasma* above, but the resemblance is spoilt below by the nearly wholly white under surface.

This Ladak Hamster is probably most nearly allied to the Tibetan *C. lama*, B.-Ham., but is considerably smaller and has a shorter tail.

With regard to the systematic arrangement of the small Hamsters, I agree with Mr. Miller as to the advisability of generically separating my *Cricetulus bedfordiae* from the others (genus *Phodopus*, Miller), and would, indeed, go further by also distinguishing the species *sungorus* and *campbelli*, which have an intermediate condition, both of foot-structure and dentition. The new genus might be called:—

CRICETISCUS, g. n.

Soles densely hairy, the three posterior of the six normal pads completely suppressed, and the three distal ones very small, hidden in the hair. Teeth neither so complicated as those of *Cricetulus*, in which there is a broad notch, and commonly a deep pit, between the outer and inner main cusps of each lamina, nor so simplified as those of *Phodopus*, in which the notch is reduced and the pit is absent.

Genotype: *C. campbelli*. (*Cricetulus campbelli*, Thos.)

Other species: *C. sungorus*. (*Mus sungorus*, Pall.)

Although *C. sungorus* was known so much the earlier, it is only represented in the material available to me by a single dried skin, in which the characters are not very clearly discernible. With both skins, skulls, and a spirit-specimen of *C. campbelli* for examination, I therefore think it advisable to make that species the genotype.

The position of Satunin's *Cricetulus roborovskii* is not clear, as his expression "Die Sohlen sind dicht mit weissem Haar bekleidet" is applicable either to a *Phodopus* or a *Cricetiscus*.

XIV.—Descriptions of New Pyralidæ of the Subfamilies Hydrocampinæ, Scopariinæ, &c. By Sir GEORGE F. HAMPSON, Bart., F.Z.S., &c.

[Continued from p. 376.]

(11) *Cutaclysta nyasalis*, sp. n.

Head, thorax, and abdomen white mixed with dark brown with a cupreous gloss; antennæ brown ringed with white; palpi white, black-brown above; fore and hind femora and tibiae black-brown above; claspers of male yellowish. Fore wing with the base white, brown at costa; an inwardly oblique orange-yellow antemedial band from cell to inner margin, defined by brown lines and with white beyond the outer line; the medial area white very thickly irrorated with dark cupreous brown; postmedial line white, slightly incurved below vein 3 and ending at fornus, an orange-yellow band beyond it from below costa to vein 3; the terminal area brown with a white line from costa before apex to termen at vein 1, an orange-yellow band beyond it on termen from apex to discal fold; cilia dark brown with some white at tips. Hind wing white, very thickly irrorated with dark cupreous brown from near base to the subterminal line, which is black-brown defined on each side by white, slightly incurved below vein 2; five partly conjoined ocellate black spots on termen from below apex to above fornus, with metallic silvery points between them, the anal spot larger with the silvery point in its centre, some orange-yellow points beyond them on termen; cilia cupreous brown at base, white slightly tinged with brown at tips.

Hab. BU. C. AFRICA, Mt. Mlanje (*Neave*), 3 ♂, 1 ♀ type. *Exp.* 10 mm.

(2 a) *Cataclysta atriterminalis*, sp. n.

♀. Head, thorax, and abdomen pale ochreous mixed with some silvery white; palpi with the 3rd joint brownish; pectus, legs, and ventral surface of abdomen white. Fore wing white, the costal area brownish ochreous; an inwardly oblique orange-yellow antemedial band from discal fold to inner margin, defined by brownish lines; a short orange-yellow fascia beyond the cell; brownish subterminal spots at veins 6 and 2 and above tornus. Hind wing white; an oblique orange-yellow medial band edged by brownish lines, the yellow extending on inner margin to near tornus; the terminal area broadly black with some whitish scales and some orange scales on termen.

Hab. CELEBES, Sangir I. (*Doherty*), 1 ♀ type. *Exp.* 10 mm.

(47 a) *Cataclysta obliquifascia*, sp. n.

♀. Head and thorax fulvous yellow mixed with grey-brown; abdomen brownish white, dorsally tinged with ochreous yellow except towards base and with dark brown segmental lines; antennae dark brown except at base; palpi yellowish, the 3rd joint dark brown; pectus, legs, and ventral surface of abdomen white tinged with brown, the fore femora towards extremities, the tibiae and tarsi dark brown, the tibiae banded with yellowish, the mid tibiae with dark brown stripe above, the tarsi ringed with dark brown. Fore wing fulvous yellow; small subbasal and antemedial brown spots on costa and slight brown marks on inner margin before and at middle; an obliquely curved reddish-brown fascia from costa before apex to middle of discocellular, with a whitish fascia below it; an oblique rather diffused reddish-brown line from before termen at discal fold to inner margin before tornus, with some whitish beyond it; a fulvous-yellow terminal band defined on inner side by a reddish-brown line; cilia white at base, brown at tips. Hind wing golden yellow, the costal area to below the cell and to beyond middle white; an oblique dark brown medial band from cell to inner margin, and a rather diffused oblique postmedial line from vein 1 to inner margin; an incurved subterminal brown line from costa to discal fold; a series of small black-brown spots before termen from below apex to vein 2, some metallic silver beyond them on termen; cilia yellow at base, with black line at middle, the tips white tinged with brown.

Hab. BRAZIL, Pernambuco (*Saale*), 1 ♀ type. *Exp.* 16 mm.

(51) *Cataclysta chinostola*, sp. n.

♀. Head and thorax white slightly tinged with rufous; abdomen white; antennae brownish except towards base; pectus, legs, and ventral surface of abdomen white, the fore legs slightly tinged with rufous and the tibiae with black-brown streak below. Fore

wing silvery white; two cupreous-brown points at base; ante-medial line cupreous brown, oblique to above vein 1, then inwardly oblique, a patch of pale yellow before it below the cell; a very oblique cupreous-brown line from middle of costa to below submedian fold well beyond middle, then recurved to inner margin, an oblique striga beyond it in end of cell and another beyond the cell, with a yellowish tinge between them; a triangular postmedial patch of the ground-colour from costa to below vein 4, defined at sides by yellow-brown lines; two cupreous-brown subterminal lines with a yellowish tinge between them, from just below costa to just above inner margin, incurved below vein 3; a cupreous-brown line before termen. Hind wing silvery white; a faint yellow and brown tinge in and below middle of cell; a straight oblique cupreous-brown medial line; postmedial line cupreous brown, incurved between veins 6 and 2; two cupreous-brown subterminal lines with a yellowish tinge between them, the inner line slightly incurved between veins 6 and 2, the outer angled outwards at vein 6, then slightly waved and joining the inner line at submedian fold; a cupreous-brown subapical striga and a line before termen from the angle of the outer subterminal line to vein 2.

Hab. PERU, Rio Pacaya, 1 ♂ type. *Esp.* 18 mm.

(4a) *Ambia ekrysogetanna*, sp. n.

Head, thorax, and abdomen white, the last slightly tinged with brown on dorsum; antennæ with an ochreous tinge. Fore wing silvery white, the costa tinged with orange-yellow towards base; a small tuft of rufous scales below middle of costa with the orange-yellow antemedial and medial lines arising below it and rather diverging towards inner margin; a conical postmedial patch defined by orange-yellow from costa to vein 5, with a brown point on the line defining its outer side at costa; an orange-yellow subterminal line, excurved to submedian fold, where it is angled inwards, a fine yellow-brown line beyond it, incurved below vein 2, the terminal area tinged with yellow. Hind wing silvery white; a small orange-yellow discoidal spot; an orange-yellow postmedial line, excurved to vein 4, then bent inwards to origin of vein 2 and oblique to inner margin; an orange-yellow subterminal line, excurved to vein 2, then incurved, a fine yellow-brown line beyond it; the terminal area tinged with yellow.

Hab. SAMOA Is., Pago (*de la Grande*), 1 ♂, 1 ♀ type. *Esp.* 12 mm.

(9b) *Ambia cymophoralis*, sp. n.

♂. Head white, the antennæ tinged with ochreous, the palpi yellow behind; thorax and abdomen white, the tegulae with sub-dorsal orange-yellow stripes, the patagia orange-yellow above and the dorsum of thorax orange-yellow except the metathorax, the abdomen banded with orange-yellow; pectus, legs, and ventral

surface of abdomen white, the fore femora above and tibiae on inner side yellowish with some black at the femoro-tibial joint. Fore wing orange-yellow with a fulvous tinge; some white at base in and below the cell; an erect silvery-white subbasal band; a silvery-white band just before middle, defined on each side by dark brown below the cell, excurved below the costa and above inner margin and emitting a spur at discal fold to the white discoidal lunule defined by black except above; the medial part of costa white; a silvery-white wedge-shaped mark in discal fold before the post-medial band, which is silvery white defined on each side by dark brown, incurved below costa, then excurved to vein 2, below which it is angled inwards, then erect with its outer edge excurved at submedian fold; a silvery-white subterminal band from costa to vein 1, defined on each side by dark brown, strongly on outer side, its extremities at costa and above vein 1 dilated into spots, excurved between those points; cilia white, chequered with brown at apex and with orange-yellow at middle and tornus. Hind wing orange-yellow with a slight fulvous tinge, the base white; a silvery-white antemedial band from cell to inner margin connected with a silvery-white patch in end of cell with a black discoidal bar on its outer edge; a silvery-white postmedial band, excurved and defined on outer side by brown to vein 2, then incurved; a silvery-white subterminal band defined on each side by black from costa to vein 1, its extremities on costa and above vein 1 expanding into spots, excurved between those points; cilia white, chequered with red-brown towards apex and at middle.

Hab. LOTISLIDE Is., St. Aignan I. (*Meek*), 3 ♂ type, Rossel I. (*Meek*), 1 ♀. *Esp.* 16-18 mm.

(16a) *Ambia rufitincta*, sp. n.

♀. Head, thorax, and abdomen white suffused with rufous, the last slightly irrorated with dark brown towards base and strongly with black towards extremity; antennae white tinged with yellow; palpi white tinged with yellow and with some black above; pectus, legs, and ventral surface of abdomen yellowish white. Fore wing white suffused with rufous and slightly irrorated with brown; a faint inwardly oblique rufous antemedial line; a curved black medial line, rather diffused on inner side and incurved at median nervure; an oblique slightly curved blackish postmedial line from costa to vein 2 above tornus, defined on outer side by white; a fine brown terminal line from costa to vein 2. Hind wing white suffused with rufous and slightly irrorated with brown except on inner area; a patch of diffused black scales in and beyond end of cell; postmedial line black, oblique and defined on outer side by white to vein 1, then obsolete and retracted to beyond lower angle of cell, then curved and rather diffused to inner margin; a fine brown terminal line except toward tornus.

Hab. PERT., Cuzco Mts. (*Garlepp*), 1 ♀ type. *Esp.* 14 mm.

(17 a) *Ambia hemigrammalis*, sp. n.

♀. Head, thorax, and abdomen white mixed with fulvous yellow and irrorated with some black scales; palpi white banded with black; pectus, legs, and ventral surface of abdomen white, the fore tibiae banded with black. Fore wing white; a subbasal black bar from costa; an antemedial black line from costa to discal fold and some scales at inner margin; a broad oblique orange-yellow shade from below costa before the postmedial line to inner margin before middle, irrorated with some black scales and with black striae ~~omit~~ on each side of the discocellulars; a strong oblique black postmedial line from costa to discal fold, then an incurved shade formed by blackish scales with the area beyond it orange-yellow; an orange-yellow bar from costa before apex, then a double curved black line filled in with silvery white; the terminal area orange-yellow, narrowing to a point below apex; cilia white, black at base at apex and with a black patch between veins 1 and 2. Hind wing white, the basal area irrorated with black and with a black patch at end of cell; the terminal half suffused with orange-yellow and slightly irrorated with brown; a dark brown shade between veins 7 and 2 before the indistinct double dark postmedial line filled in with white; a narrow white band defined by slight dark lines before the termen which is yellow, the band not extending to tornus; cilia white, dark brown at base from vein 1 to tornus.

Hab. PERU, Yungas de la Paz (*Seebold*), 1 ♀ type. *Esp.* 12 mm.

(17 b) *Ambia sufetulodes*, sp. n.

♀. Head, thorax, and abdomen white mixed with dark brown, the prothorax and patagia at middle with brown spots, the abdomen suffused with brown towards extremity, leaving white segmental lines; palpi and maxillary palpi white banded with black; pectus, legs, and ventral surface of abdomen white, the fore tibiae, spurs, and tarsi banded with black. Fore wing white, the basal and terminal areas suffused with brown, the medial area with broad brownish shade; a white subbasal band, defined on inner side by black; a white antemedial band, defined on each side by black and incurved below submedian fold; two semicircular white marks defined by black on medial part of costa, the first with black point at costa; a small round black discoidal spot; a postmedial white band defined on each side by black, excurved to vein 5, then incurved, expanding somewhat at costa; an oblique white streak from apex and a blackish line before termen excurved at middle; a dark terminal line except at the excision at discal fold; cilia white with some brown at apex and middle. Hind wing white, the terminal area suffused with brown, broadly towards costa and narrowing to tornus; some brown near base; a broad oblique

brown band from discal fold before the small blackish discoidal spot to inner margin before the postmedial line, with a white bar on it at inner margin; postmedial line black defined on outer side by white, incurved below discal fold, then excurved; a black line before termen; a black terminal line from apex to vein 3 except at the excision at discal fold, and black striae at veins 2 and 1; cilia white with some brown at apex and middle.

Hab. PERU, R. Pacaya, 1 ♀ type. *Exp.* 14 mm.

(22b) *Ambia fulvicolor*, sp. n.

♂. Head, thorax, and abdomen yellow suffused with fulvous, the last with subdorsal white segmental bands; frons and 3rd joint of palpi white; pectus, legs, and ventral surface of abdomen white tinged with fulvous. Fore wing yellow suffused with fulvous; an oblique subbasal silvery-white band from cell to inner margin, with some red-brown before it; some dark brown on costa before the antemedial silvery-white band, which is interrupted in the cell, oblique towards costa and below the cell and defined by red-brown; the cell suffused with red-brown except towards base; a fulvous lunule at end of cell defined by dark brown and with some white beyond it; the fovea above end of cell white defined by dark brown and with a silvery-white point above it on costa; some dark brown on costa before an oblique silvery-white postmedial band from costa to vein 4 and a triangular mark from vein 2 to inner margin, both defined on outer side by the dark brown postmedial line which is angled inwards at vein 2, the costa beyond it dark brown; a slightly sinuous dark brown subterminal line with a series of small silvery-white spots before it from below costa to inner margin, the hair on which is dark brown below it; cilia white mixed with some yellow and chequered with dark brown below apex and at veins 4, 3, 2. Hind wing yellow suffused with fulvous along median nerve and on terminal area, the base white; an oblique silvery-white antemedial band defined by dark red-brown; a fulvous discoidal spot defined by dark red-brown; postmedial line dark brown defined on inner side by a silvery-white band, slightly incurved below vein 4; a sinuous dark brown subterminal line defined on inner side by silvery-white spots, small to vein 5, then interrupted to just above vein 3, larger and more diffused below vein 3; cilia white mixed with some yellow, chequered with dark brown at apex and between veins 5 and 2.

Hab. BR. N. GUINEA, Kumbi R. (*Meek*), 1 ♂ type. *Exp.* 18 mm.

(23b) *Ambia albiflavalis*, sp. n.

♂. Head, thorax, and abdomen white tinged with yellowish; antennae ochreous; frons yellow; palpi yellow with the 3rd joint white; pectus, legs, and ventral surface of abdomen white. Fore

wing silvery white; the base orange-yellow with oblique outer edge; an obliquely curved orange-yellow antemedial band; an orange-yellow band from end of cell to inner margin, the end of cell tinged with brown and the fovea above it with two brown points on its upper edge, a yellow patch with a white spot on it beyond it on costal area; an orange-yellow subterminal band defined at sides by brown, obliquely curved to vein 2, then bent outwards to tornus, giving off on inner side between veins 4 and 2 a yellowish fascia tinged with brown to lower end of cell; a pale brown terminal band. Hind wing silvery white; an orange-yellow antemedial band from cell to inner margin; a curved orange-yellow postmedial band defined by red-brown from costa to vein 1, its outer edge angled outwards at vein 4; a sinuous orange-yellow subterminal band defined by red-brown and ending at tornus, its outer edge excurved at discal fold to the narrow orange-yellow terminal band defined on inner side by a red-brown line and ending at submedian fold.

Hab. S. NIGERIA, Lagos (*Dudgeon*), 1 ♂ type. *Exp.* 14 mm.

(23*f*) *Ambia niveiplagalis*, sp. n.

♂. Head, thorax, and abdomen white mixed with red-brown and dark brown, the head with dark line between antennæ, the tegulæ dorsally and patagia at middle with white patches, the abdomen pale towards extremity and with white bands; antennæ yellowish ringed with black; palpi pale red-brown, the 3rd joint white with red-brown band towards extremity; pectus, legs, and ventral surface of abdomen white, the fore legs tinged with red-brown, the abdomen with faint brownish bands. Fore wing yellowish tinged with rufous and irrorated with dark brown; an inwardly oblique blackish antemedial line, excurved above inner margin and with a dark shade before it from subcostal nervure to inner margin; an oblique slightly sinuous blackish medial line with a white striga before it in and below the cell, where it is conjoined to a silvery-white patch below the submedian fold extending to inner margin and to the antemedial line; a quadrate silvery-white spot beyond the cell defined by blackish and a quadrate patch from vein 2 to inner margin defined by blackish at sides, the fovea above end of cell white; an oblique elliptical silvery-white patch defined by blackish from costa, to which it narrows, to vein 4; an apical white spot, then a curved series of white spots defined by blackish, minute to vein 3, the spots below veins 3 and 2 larger; cilia red-brown mixed with white. Hind wing yellowish tinged with rufous and irrorated with dark brown; a broad subbasal silvery-white band defined by dark brown and with red-brown spot on it at inner margin; a rather lunulate silvery-white spot beyond the cell defined by dark brown; a rounded postmedial silvery-white patch defined by dark brown from costa to vein 4, a spot below vein 3, and a curved band from vein 2 to above tornus; a triangular silvery-

white apical spot, small conjoined subterminal spots above and below vein 4 and larger rather wedge-shaped spots below veins 3 and 2; cilia reddish brown mixed with some white.

Hab. PERU, Carabaya, Oconeque (*Ockenden*), 1 ♂ type. *Exp.* 20 mm.

(30*b*) *Ambia melanistis*, sp. n.

♀. Head, thorax, and abdomen black-brown mixed with some white; pectus, legs, and ventral surface of abdomen white. Fore wing very dark red-brown with a blackish tinge; an antemedial white point on costa and medial bar from costa; a slightly ex-curved punctiform white postmedial line from costa to discal fold, the line then almost obsolete and incurved below vein 4, with white points above and below vein 1, a metallic silvery patch before it between veins 3 and 1 and a small spot at middle of inner margin; a curved punctiform white subterminal line; cilia whitish. Hind wing very dark red-brown with a blackish tinge; the basal part of costa white; an antemedial white point on inner margin; a small metallic silvery spot beyond the cell; an oblique postmedial white band from costa to vein 4 and a minute spot above tornus; a curved white subterminal line from costa to discal fold and a series of striae between discal fold and vein 1; the termen more rufous; cilia white.

Hab. FORMOSA, Kanshirci (*Wileman*), 1 ♀ type. *Exp.* 12 mm.

(38*a*) *Ambia argentistriata*, sp. n.

Fore wing of male on underside with large costal fold from before middle to near apex; hind wing in both sexes on upperside with tuft of long spatulate hairs below end of cell.

♂. Head, thorax, and abdomen yellow, the tegulae and patagia with scarlet streaks, the abdomen dorsally suffused with rufous; palpi tinged with rufous; pectus, legs, and ventral surface of abdomen white tinged with rufous. Fore wing orange-yellow; the basal area suffused with scarlet, irrorated with a few black scales and with some silver scales below costa; a curved scarlet antemedial line; the medial area except towards costa and the postmedial area below vein 4 with a silvery gloss finely striated with dark brown; a scarlet line from upper angle of cell, oblique to vein 3, then erect, with a yellow streak tinged with scarlet in submedian fold to the antemedial line and beyond it on the silvery area, the area beyond the line, except the silvery area, yellow tinged with scarlet with brilliant silver streaks defined by black scales in the interspaces of the postmedial area from below costa to vein 4 and a streak of black scales below vein 4, its extremity connected by a line formed by black scales with the inner margin and incurved at submedian fold; a curved brilliant silver line before termen and a terminal series of black striae; cilia with brown mixed

except at base. Hind wing white; a triangular area from origin of vein 2 to termen between discal fold and vein 2 orange-yellow; the tuft of scales below end of cell black; a curved scarlet post-medial line between veins 5 and 2; a brilliant silver line before termen from costa to vein 5, then a series of small brilliant silver spots with black points before and beyond them on each side of veins 4 to 2; the termen narrowly orange-yellow to apex; cilia white, their bases orange-yellow with a brown line at base to vein 2.

Ab. 1. Head, thorax, abdomen, fore wing, and the triangular patch on hind wing yellowish suffused with rufous, the scarlet markings replaced by rufous, the fore wing with silvery marks before the antemedial line in the interspaces.

Hab. W. COLOMBIA, Jimenez, 1 ♂ type, W. slopes, 1 ♂. Exp. 20 mm.

(38c) *Ambia phæomerilis*, sp. n.

♀. Head, thorax, and abdomen grey-white mixed with brown; palpi, pectus, legs, and ventral surface of abdomen white tinged with brown, the tarsi dark brown ringed with white. Fore wing grey-white thickly irrorated with brown; an indistinct brown medial line defined on inner side by whitish, excurved to median nervure, then sinuous; a slight dark discoidal spot; a large patch of dark brown suffusion from costa to vein 2 before the postmedial line which is white slightly defined on outer side by brown and excurved from costa to vein 2 near termen, then almost obsolete and retracted to below the angle of cell, then more distinct, defined on inner side by brown and waved to inner margin; a series of dark striae before termen from below apex to above tornus. Hind wing white thickly irrorated with dark brown, the base, cell, and costal area to near apex white; the tuft of hairs below end of cell black-brown; subterminal line white, excurved to vein 2, then sinuous; a series of ocellate black spots on termen from apex to submedian fold, defined on inner side by white with a fine sinuous dark line before it and with slight orange marks between them, the spots from apex to discal fold minute, then larger and with a black line beyond them on termen; cilia white, metallic silver at base.

Hab. BOLIVIA, Yungas de la Paz (*Seebold*), 1 ♀ type. Exp. 22 mm.

(4a) *Oligostigma centrismacula*, sp. n.

Antennæ of male fringed with hair above at one-third from base; hind tibiae fringed with hair below towards base.

Head and thorax white, the head tinged with rufous behind, the patagia with some black-brown on outer edge; abdomen white, suffused with pale yellow except towards extremity; antennæ tinged with rufous; palpi with some black on extremity of 2nd joint behind; pectus, legs, and ventral surface of abdomen white,

the fore femora above and tibiae on inner side black, the tarsi ringed with black. Fore wing orange-yellow, the costa red-brown to end of cell; a white fascia in the cell from before middle extending to well beyond the cell and with the dark cupreous red-brown discoidal spot on it; a curved silvery-white subterminal band defined on outer side by a black line from below costa to submedian fold in which it is bent inwards as a streak; a fine brown terminal line; cilia white. Hind wing with the basal half white with oblique outer edge defined by a strong black-brown line between discal and submedian folds: the terminal half orange-yellow with oblique silvery-white subterminal bar from costa to vein 6 and subterminal silvery-white band defined by dark brown lines between veins 4 and 1; four minute rather quadrate black spots on termen between vein 5 and submedian fold; cilia white, metallic silvery at base beyond the spots.

Hab. QUEENSLAND, Kuranda (*Dodd*), 1 ♂, 1 ♀ type. *Exp.* 16 mm.

(1c) *Oligostigma peruricensis*, sp. n.

Head and thorax dark brown mixed with white, the patagia with white streak on upper edge towards base, the metathorax edged with white; abdomen brown with white segmental bands; antennae white ringed with brown; palpi brown with some white in front and at tips; pectus, legs, and ventral surface of abdomen white, the legs tinged with brown, the abdomen tinged with brown except towards base and with white segmental lines. Fore wing cupreous brown mixed with some ochreous; an obliquely curved somewhat dentate blackish subbasal line defined on each side by slight white marks except towards costa; antemedial line white defined on each side by dark brown, oblique to median nervure, angled outwards at median nervure and submedian fold, then very oblique, forked white streaks beyond it at submedian fold: the medial area with white spots on costa, in the cell, and at inner margin; a white medial line, oblique to submedian fold, then excurved; a rather lunulate black discoidal spot defined by ochreous; the postmedial area with a loop formed by sinuous white lines from costa to vein 2, enclosing a white band to vein 4 rather constricted below costa; a narrow white band from below costa to vein 1, its inner edge irregular and incurved at discal and submedian folds before an orange-yellow terminal band defined on inner side by a black line and on outer by black striae on termen; cilia white with a brown line near base and the tips with brown mixed. Hind wing cupreous brown; a sinuous white subbasal band; a white antemedial line; a broad white medial band; postmedial line white, angled inwards below costa and outwards at vein 4, then bent inwards and sinuous to inner margin; a white band with sinuous inner edge from discal to submedian fold before the terminal orange-yellow band defined on inner side by a black line; a series of five small ocellate black

spots on termen from vein 7 to below 4, the spots below veins 7 and 5 double, each with a white point on them; cilia white mixed with brown and with a brown line near base.

Ab. 1. Fore wing without the white in end of cell or in the postmedial loop.

Hab. PERU, Carabaya. R. Huacamayo, La Union (*Ockenden*), 1 ♂, 1 ♀, La Oroya (*Ockenden*), 2 ♂, 3 ♀ type. *Exp.*, ♂ 22-26, ♀ 32-38 mm.

(1 d) *Oligostigma rufiterminalis*, sp. n.

♀. Head and thorax greyish suffused with red-brown; abdomen whitish tinged with red-brown and slightly irrorated with black; palpi white tinged with red-brown and irrorated with black; pectus, legs, and ventral surface of abdomen whitish, the legs tinged with red-brown, the fore tibiae with white band at middle and black band at extremity. Fore wing greyish suffused with red-brown; blackish points near base in and below the cell; a rather diffused black antemedial line, excurved to below vein 1 and bent inwards to inner margin; the medial area with rufous streaks irrorated with black in discal and submedian folds; a somewhat inwardly oblique black medial line, slightly excurved below costa; an elliptical rufous discoidal spot defined by black; postmedial line black slightly defined on outer side by whitish, very slightly waved towards costa, then excurved to vein 2, where it is strongly angled inwards, then oblique; a narrow silvery-white band from below costa to vein 1, above which it forms a small spot with a deeper red-brown shade before it, before the narrow orange-yellow terminal band defined on inner side by a black line; cilia whitish tinged with red-brown. Hind wing whitish tinged with red-brown, the area beyond the postmedial line rufous; a curved black subbasal line; a round yellow discoidal spot defined by black; postmedial line black, excurved to vein 3, then incurved; a narrow silvery-white subterminal band defined on outer side by a black line with some yellow beyond it; the termen narrowly whitish between veins 6 and 2, with four minute black spots on it; cilia whitish tinged with red-brown.

Hab. MADAGASCAR, 1 ♀ type. *Exp.* 24 mm.

(12 a) *Oligostigma piperitalis*, sp. n.

♀. Head and thorax grey tinged with rufous and irrorated with dark brown; abdomen white with diffused rufous bands; antennae dark brown, pale red-brown towards base; palpi red-brown; pectus, legs, and ventral surface of abdomen white, the fore and mid legs tinged with red-brown. Fore wing grey tinged with rufous and thickly irrorated with dark brown; a short blackish streak in middle of cell and small rather diffused discoidal spot; a narrow white band from below costa to vein 1 before the fulvous-yellow

terminal band defined on inner side by a fine dark line; a fine dark terminal line; cilia whitish tinged with rufous and with a fine dark line near base. Hind wing pale rufous irrorated with dark brown; the base white; a narrow oblique white antemedial band, diffused outwards at costa; a small blackish discoidal spot; a narrow white postmedial band excurved to vein 4, then incurved; a narrow white band defined on inner side by diffused blackish and on outer by a black line from below costa to inner margin before the fulvous-yellow terminal band; a white terminal line with minute black spots on termen below veins 7, 5, 4, 3, defined on inner side by a black line which is slightly waved before the spots, the termen with a fine black line at apex and below the spots; cilia white faintly tinged with brown.

Hab. N. NIGERIA, Zungeru (*Macfie*), 1 ♀ type. *Exp.* 18 mm.

(18b) *Oligostigma flavialbata*, sp. n.

♀. Head, thorax, and abdomen white, the shoulders with some rufous, the metathorax yellow behind; palpi and maxillary palpi banded with rufous; fore tibiae tinged with rufous with a white spot at middle. Fore wing silvery white, the costa tinged with rufous at base, then with yellow to beyond middle, the inner margin with a pale yellow patch before middle; a small rufous spot in upper part of middle of cell; a yellow discoidal spot defined by rufous scales; a silvery-white subterminal band defined by pale brown lines with diffused pale yellow before it and the terminal area beyond it pale yellow; cilia white tinged with rufous. Hind wing white; the subbasal area pale yellow, diffused on inner side and defined on outer by a pale brown line; a pale brown postmedial line, excurved below costa, the area beyond it pale yellow with a narrow silvery-white subterminal band on it; the termen with minute black bars at veins 6 to 2; cilia white tinged with rufous.

Hab. MADAGASCAR, Betsileo (*Cocan*), 1 ♀ type. *Exp.* 22 mm.

(23b) *Oligostigma leucomma*, sp. n.

♂. Head and thorax fulvous yellow mixed with white; abdomen white suffused with fulvous yellow except at base; palpi white at tips; pectus, legs, and ventral surface of abdomen white suffused with fulvous yellow. Fore wing white, the costal and terminal areas suffused with fulvous yellow; black subbasal striae above and below vein 1; an antemedial fulvous-yellow band, defined on outer side by some dark scales below the cell; a slightly waved blackish medial line somewhat excurved below the costa; the outer half of medial area fulvous yellow, suffused with blackish below the cell; postmedial line blackish, defined on outer side by white to vein 4 and with a white spot before it beyond the cell, slightly incurved below costa and excurved at middle, at vein 4 bent inwards to lower angle of cell, then waved to inner margin; a black subterminal line

defined on inner side by a narrow white band, incurved from costa to discal fold and below vein 2, excurved at middle; a black terminal line; cilia white, black at apex and middle. Hind wing white, the terminal area suffused with fulvous yellow; a curved yellow antemedial line with some dark scales on it below the cell; a blackish discoidal bar; postmedial line fulvous yellow, excurved to vein 1, then bent inwards to lower angle of cell, then with some dark scales on it and excurved above inner margin; a slightly sinuous black subterminal line with a narrow white band on its inner side, excurved at middle; cilia white with a blackish line near base and some dark scales at tips to vein 2.

♀. Head, thorax, abdomen, and fore wing almost entirely fulvous yellow, the last without the white spot before the postmedial line and the white beyond the postmedial line and before the subterminal line reduced.

Hab. QUEENSLAND, Stradbroke I. (Turner), 3 ♂, 1 ♀ type. *Exp.* 16-18 mm.

(23c) *Oligostigma fulvicolor*, sp. n.

♂. Head, thorax, and abdomen fulvous, the last with some yellow mixed; frons white; tarsi white at base. Fore wing fulvous mixed with some yellow; a whitish antemedial spot on costa with a slight dark streak below it; an inwardly oblique slightly sinuous silvery-white medial band defined on each side by blackish except at costa and with a slight dark streak beyond it below costa to an elongate white spot defined by dark scales above end of cell; a white point defined by dark scales at upper angle of cell and a slight oblique dark streak below lower angle with a yellow mark above it extending to the postmedial narrow silvery-white band defined on each side by black-brown except at costa, obliquely curved to vein 2, then incurved; a subterminal series of short dark streaks with some whitish on the streaks above and below vein 2; cilia dark brown. Hind wing fulvous; a narrow slightly sinuous silvery-white antemedial band defined on each side by black-brown; a similar postmedial band, obliquely curved to vein 1, then bent outwards to tornus; a subterminal series of slight rather wedge-shaped dark marks with some whitish in centres; cilia dark brown.

Hab. PERU, Carabaya, Oconeque (Ockenden), 3 ♂ type. *Exp.* 31-38 mm.

(28b) *Oligostigma flavipictalis*, sp. n.

♀. Head, thorax, and abdomen white, the hind tarsi tinged with yellow on inner side. Fore wing silvery white; a golden-yellow patch at base of costa, slightly defined on outer side by brown; a curved golden-yellow antemedial band, slightly defined on each side by brown towards costa, where it is somewhat dilated;

a slight brown discoidal striga; an orange-yellow patch below end of cell in submedian interspace, its inner edge connected by a bar with inner margin and its outer edge defined by a slight brown line continued to inner margin; an oblique orange-yellow mark on costa above end of cell defined on inner side by a brown striga; an orange-yellow postmedial patch below costa with which its inner edge is connected by an oblique bar, defined at sides by slight brown lines; a curved orange-yellow subterminal band from costa to below vein 1 where it is bent inwards, its inner edge defined by a blackish line to discal fold and with a slight oblique brownish line from the inner side of its recurved part to tornus; a narrow orange-yellow terminal band defined on inner side by a fine black line, curved inwards at tornus. Hind wing silvery white; a curved orange-yellow subbasal band defined on outer side by a slight brown line; an orange-yellow medial band defined by slight brown lines, its outer edge forming a hook at vein 4, then incurved; an orange-yellow subterminal band defined by fine black lines, its inner edge strongly incurved from below vein 4 to submedian fold; the termen narrowly white with a fine terminal black line; cilia chequered yellow and white with some blackish scales at tips.

Hab. SINGAPORE (*Meade-Waldo*), 1 ♀ type. *Exp.* 14 mm.

(13 a) *Aulacodes hemimelana*, sp. n.

♀. Head and thorax black-brown; abdomen yellowish tinged with black-brown and with some white at base; pectus white; legs and ventral surface of abdomen yellow, the fore legs tinged with red-brown, the fore femora black-brown above. Fore wing black-brown; a curved silvery-white band from below costa to vein 1 before the golden-yellow terminal band defined on inner side by black striae and on outer by a terminal series of black points and striga at submedian interspace; cilia silvery white. Hind wing white with a black-brown patch at base, the terminal area broadly golden yellow defined on inner side by a black line between discal and submedian folds; a minute ocellate white spot defined by black on termen at discal fold, then three minute black spots with some red between them to vein 2; cilia silvery white, brown at base beyond the spots.

Hab. PHILIPPINES, Manila (*Ledyard*), 1 ♀ type. *Exp.* 18 mm.

(23 b) *Aulacodes quadriplagiata*, sp. n.

♂. Head and thorax fulvous yellow; abdomen white tinged with yellow; palpi with some brown at side of 2nd joint; legs yellow, the fore tibiae with dark brown band at extremities, the tarsi ringed with brown; pectus and ventral surface of abdomen white. Fore wing with the basal half black-brown except the costal area which is fulvous yellow at base, then white, and a conical white ante-

medial spot at inner margin; a medial white band leaving the costal yellow; a semicircular deep chocolate-brown postmedial patch from below costa to vein 3 defined on outer side and below by a curved silvery-white band and shading to red-brown at costa before the white band; a terminal yellow band defined on inner side by a black line to submedian fold, the yellow band bent inwards on inner area to near the basal black-brown area; a terminal series of black points and small spot below apex; cilia silvery white, tinged with brown at apex. Hind wing silvery white, the terminal area broadly bright yellow, extending on inner area to near base; the white area defined by a curved black line between discal and submedian folds; subterminal black stria above and below vein 2, then a curved silvery-white line to above termen; a curved silvery-white line from costa before apex to termen at discal fold; minute silvery-white ocellate spots defined by black and with black points on their outer edge above and below vein 4 before termen; a minute black spot below vein 3 and striga below vein 2; cilia silvery white tinged with red-brown at base.

♀. Fore wing with the basal half chocolate-brown, its upper edge indented by an elongate white mark in the cell and with white streak below it on inner margin, the whole costal area above it yellow, the postmedial patch red-brown and extending to submedian fold.

Hab. D'ENTRECASTEAUX Is., Goodenough I. (*Meek*), 1 ♂, 2 ♀ type. *Esp.* 20-26 mm.

(24a) *Aulacodes costifascialis*, sp. n.

Hind tibiae of male rather curved downwards and fringed with hair throughout.

Head, thorax, and abdomen white suffused with yellow, the abdomen yellower except at base; palpi red-brown towards tips; fore legs with the femora black-brown above, the tibiae with black-brown band at extremity. Fore wing golden yellow; a rufous fascia on costa to end of cell, where it expands into a triangular patch to lower angle of cell, a silvery-white fascia below it in and just below the cell; a wedge-shaped silvery-white patch beyond the cell from below costa to vein 2, defined by slight fuscous lines; a curved silvery-white subterminal band from costa to above vein 1, where it is somewhat bifid, defined by fine black lines except at costa; a terminal series of black points and striga in submedian interspace; cilia silvery white. Hind wing silvery white, the inner and terminal areas broadly golden yellow, the white area defined by an oblique sinuous black postmedial line from vein 6 to submedian fold; an obliquely curved silvery-white line from costa before apex to termen at discal fold; four minute ocellate silvery-white spots before termen between vein 5 and submedian fold, the two upper spots with black points on their outer edges, the two lower with black points beyond them, some orange-red on termen

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between the spots and two minute black points above them above vein 5; cilia silvery white with some brown at base beyond the spots.

Hab. D'EXTRECASTEAUX Is., Goodenough I. (*Meek*), 2 ♂, 1 ♀ type; BISMARCK ARCH., Rook I. (*Meek*), 2 ♂, 1 ♀. *Exp.* 20-24 mm.

(21b) *Aulacodes nigriplagialis*, sp. n.

Eristena trigonalis, ab. 1, Hampson, A. M. N. H. (7) xviii. p. 390 (1906).

Hind tibiae of male slightly fringed with hair above towards extremity.

Head, thorax, and abdomen orange-yellow, the head and tegulae with some brown mixed; palpi irrorated with dark brown; pectus and ventral surface of abdomen white suffused with orange-yellow, legs orange-yellow, the fore tibiae with dark brown band at extremity. Fore wing orange-yellow; a very dark red-brown fascia on costa to end of cell, the end of cell below it white; a large conical very dark red-brown patch tinged with blackish from postmedial part of costa to vein 2, defined on inner side by a curved dark line met at vein 2 by another faint curved dark line traversing the patch and with a slight greyish tinge between them, a silvery-white band defining the outer edge of the patch defined on outer side by a fine curved black line; a terminal series of black points, forming a minute spot below apex and striga at submedian interspace; cilia silvery white. Hind wing orange-yellow, the costal area whitish to beyond middle; an oblique black postmedial line between discal and submedian folds; an oblique silvery-white line from costa before apex to termen at discal fold; four small black spots before termen between discal and submedian folds, the two upper spots defined on inner side by silvery white, with a wavy black line before them diverging obliquely below the 2nd spot, some orange-red on termen between the spots; cilia silvery white, brown at base beyond the spots.

Hab. DUTCH N. GUINEA, Fak-fak (*Pratt*), 1 ♂ type, Kapaur (*Doherty*), 1 ♀. *Exp.* 18 mm.

(24c) *Aulacodes dolicheplagia*, sp. n.

♂. Head white, the frons suffused with golden yellow, the back of head with some brown; thorax silvery white, the shoulders, tips of patagia, and metathorax dark brown; abdomen golden yellow, white at base; antennae yellow; palpi red-brown, white at base; pectus, legs, and ventral surface of abdomen white, the legs tinged with yellow, the fore femora above and tibiae at extremities dark brown. Fore wing dark brown; a silvery-white fascia below base of cell conjoined to a patch in end of cell; a large oblique conical silvery-white patch from postmedial part of costa to below vein 3 beyond the cell; a series of white striae before the narrow orange-yellow terminal band defined on inner side by a black line; a

terminal series of black points; cilia brown at base, silvery white at tips. Hind wing silvery white; a dark brown patch at base; the terminal area golden yellow, expanding on inner area to middle, defined on inner side by a series of dark points from below costa to vein 2 and a striga at vein 1; a series of silvery-white marks before termen from below costa to submedian fold, defined by blackish, the spot below costa round, the others elongate except the small spot below vein 5; minute terminal black spots above and below vein 4 and slight striae towards apex and between veins 3 and 1; cilia silvery white with some brown at apex and a brown line through them from vein 5 to near tornus.

Hab. DUTCH N. GUISEA, Fak-fak (*Pratt*), 1 ♂ type. *E.sp.* 2½ mm.

[To be continued.]

XLVI.—*Descriptions and Records of Bees.*—LXXV.

By T. D. A. COCKERELL, University of Colorado.

Xylocopa draconis, sp. n.

♂.—Length about 25 mm., anterior wings 18.5 mm.

Black, without any metallic tint; thorax thickly covered (except bare space on disc) with reddish-ochreous velvety hair; abdomen not banded. Eyes extremely large, converging above; mandibles bidentate, with a yellow basal patch; tubercle of labrum small; clypeus ivory-colour, more or less brownish, with a pair of black spots, the surface of clypeus closely punctured, but an impunctate median ridge; supraclypeal area almost pallid; ocelli large, far down on front; face and front with red-brown hair, darkest around ocelli; top of head and cheeks with reddish-ochreous hair; anterior femora swollen, without hair below; anterior and middle tibiae with bright fulvous hair on outer side, reddish on inner, and sooty behind; anterior tarsi similarly coloured, but from middle of basitarsus on there is creamy-white hair on under side posteriorly, beneath the sooty, and on apical part of basitarsus anteriorly and beneath the red is very bright; middle tarsi with reddish-black hair above and behind, but red beneath; hind femora broad, basally keeled beneath, with a pustuliform swelling on the side of the keel; hind tibiae with a conspicuous apical lobe, much broader than long, on inner side; hind basitarsi with ochreous hair in front, black above and red behind, the

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under side presenting a large, bare, shining, elevated, wedge-shaped surface; tegulae black. Wings brown, subtranslucent, apically suffused with rosy-purple; venation very different from that of *X. sinensis*, Smith, the third submarginal cell not conspicuously broadened or bulging apically, and the second much less elongated. Abdomen with sooty hair on first segment, second with fulvous, sooty only along apical margin, the rest with scanty hair except at sides and apex; at sides it is sooty, except anteriorly on segments 3 and 4, where is some fulvous; at apex the hair is long and reddish; beneath, the hind margins of the segments are narrowly bright ferruginous and the hair is fulvous.

Southern China (no other particulars known). In U.S. National Museum.

Resembles *X. appendiculata*, Smith, but the hair is quite differently coloured. There is also a general resemblance to the smaller *X. collaris*.

Xylocopa punctifrons, sp. n.

♂.—Length about 21 mm., anterior wings 16 mm.

Clypeus (except lower margin, broadening laterally), transverse supraclypeal mark and lateral face-marks (ending very obtusely halfway up front) ivory-colour; labrum black, with a minute light point; thorax without conspicuous light hair, except at sides, where a broad band of greyish hair extends from the tegulae to the ventral surface. Abdomen with a little pale hair on first segment. Wings dark reddish fuliginous, with strong purple tints: light hair on hind tibiae, and middle and hind tarsi, as in *X. tarsata*, but it is ochreous.

French Congo (Queensland Museum). Received by the Museum from Le Moult of Paris.

Very close to *X. tarsata*, Smith, but considerably larger, with the greater part of clypeus and sides of face densely punctured. The colour of the hair on the legs agrees with that of *X. tarsata*, var. *nanulowensis*, Strand, but that form has the size of *tarsata*. It is possible that *X. punctifrons* is the undescribed male of *X. tuberculiceps*, Ritsema, but the legs have much more light hair than in the female of that species, and the localities are far apart.

In the same lot came *X. carinata*, Smith, *Mesotrichia prausta* (Smith), and *Crocisa excisa*, Friese, from Dimbroko, French W. Africa.

Centris maroniana, sp. n.

♂.—Length about 28 mm., anterior wings 22.5 mm.

Robust, black, including the legs, but anterior trochanters and tibiae suffused with chestnut-red. Eyes very large, converging above; ocelli large, practically contiguous, and lateral ones distant from eyes less than half diameter of one; sides of face, supraclypeal area and upper part of clypeus ferruginous; the rest of clypeus and the labrum chrome-yellow; scape short and stout, dark reddish, yellow in front; mandibles elbowed near apex; hair of head clear ferruginous; disc of mesothorax and mammiform elevations of scutellum shining; thorax densely covered with velvety hair, black, with a faint rusty tint dorsally, except anteriorly, where it is rich deep red, the red gradually fading into the black; pleura with dark reddish hair; anterior legs with red hair, black on basitarsi; middle and hind legs with long pure black hair; tegulae ferruginous. Wings dark fuliginous, brilliantly purple, with some shades of green. Abdomen with short velvety hair, which is black except a broad yellowish-white (olivaceous-tinted) band, occupying second segment except base and third except extreme apex.

"Guyane, Maroni" (Queensland Museum; received from Le Moult).

Related to *C. smithiana*, Friese (which I have from F. Smith's collection), but larger, with the hair of the thorax dorsally black except in front. From the character of the ocelli, it possibly flies in the evening or at night. The bee-fauna of Maroni, as shown by the same collection, includes the following:—*Acanthopus splendidus*, Fab., *Aglæa cerulea*, Lep., *Exerete frontalis*, Guér., *Oxia festiva*, Sm., *Xylocopa barbata*, Fab., *Bombus incurum*, Frankl., *Centris obsoleta*, Lep., *C. americana*, Klug., *Epicharis conica*, Sm., *E. schrottkyi*, Friese, *E. affinis*, Sm., *Ceratina leta*, Spin., *Eulema dimidiata*, L., *E. fasciata*, Lep., *E. mocsaryi*, Friese, *E. smaragdina mexicana*, Mocs., *Englossa boulei*, Lep., *Eufriesia pulchra*, Sm., &c.

Pachymelus mediocinctus, sp. n.

♂.—Length 18 mm., length of anterior wing 14 mm.

Black, with tarsi dark red; eyes large, slightly converging above; clypeus prominent, but flattened on disc, yellow, with upper and lateral margins and two conspicuous spots black; labrum large, emarginate at apex, yellow, with lateral and inferior margins narrowly black; mandibles

bidentate, the inner tooth short (style of *P. hova*), basal part of mandibles mainly very pale yellowish; scape with a yellow stripe in front. Face, front, and vertex with long black hair, but also white at sides of face and (appressed) on each side of labrum; occiput and cheeks with long white hair; mesothorax shining, but distinctly punctured; scutellum only feebly bigibbous; thorax with black hair, becoming obscurely ochreous along anterior margin of mesothorax, bright ochreous (forming a conspicuous wide band) on metathorax, and pure white in middle of ventral surface. Legs with mainly black hair; anterior tibiae with a band of appressed golden pubescence in front; tegulae black. Wings dilute fuliginous; venation as in *P. microlephas*, but second s.m. narrower. Abdomen closely punctured, basal segment with black hair; apical margin of second segment, and all of next three except base, covered with appressed bright ferruginous pubescence; sixth segment with hair partly red and partly black; apical plate emarginate.

Miarinarivo, Madagascar (Queensl. Museum; from Le Mout).

Similar to *P. cambouei*. Sauss., but that is a very much larger species, with the scutellum different.

Hyleoides concinnus (Fabricius).

Lanncoston, Tasmania, Feb. 15-16, 1916 (*F. M. Littler*).

Genus new to Tasmania. The female agrees with mainland specimens; but the male, compared with one from Sydney, differs by the wholly black prothorax and the more distinct punctures of second abdominal segment.

Megachile derelicta, Cockerell.

♀.—St. Patrick's R., Tasmania, 6.2.14 (*Littler*).

New to Tasmania.

Mesotrichia bryorum (Fabricius).

Daru, Papua (Queensland Mus.).

The female has the wings suffused with rosy-purplish, whereas Australian examples usually have them much more green.

Eulæma amabilis, sp. n.

♂.—At first sight exactly like *E. bruesi*, Ckll., but differing thus: green of mesothorax more brilliant, extending along the sides to the posterior end, where it is very

bright and broadly margined mesad with blue; scutellum with lateral sulci strongly marked, the general surface of scutellum dark purplish and shining, the lateral margins thickened and shining steel-blue; median smooth ridge of labrum little broadened above; apex of abdomen broadly emarginate, formed as in *E. manni*, Ckll. From *E. manni* it is at once known by the strong keel down middle of clypeus, the dark black-haired first abdominal segment, the blue margins of scutellum, &c. From *E. smaragdina*, Perty, by the black hind tibiae, marked with green posteriorly (with a rather small but distinct tubercle above the spurs), and the entirely black hair of thorax. From *E. auripes*, Gribodo, by the strong clypeal keel, the less prominent lateral keels of labrum, and the hair of legs differently coloured, the fringe on apical part of anterior tarsi ferruginous, while the pubescence on outer face of middle basitarsi is shining creamy-white. It is also distinct from *E. mexicana* and the various related forms described by Friese and others. The mesopleura is dark blue.

Manaos, Brazil (*Miss H. B. Merrill*). U.S. Nat. Museum.

Mesonychium dugesi, sp. n.

♂.—Length about 15 mm.

Very robust, black, with the abdomen dark but brilliant blue, the hind margins of the segments more or less green; disc of mesothorax dark purple-blue on each side of the median sulcus; pubescence at first sight appearing wholly black, but it is mixed with ochreous on labrum and lower part of clypeus, and there is a spot of the same on each side of front; on lower part of pleura is a little pale hair, and there is white hair on anterior tibiae posteriorly; second and third antennal joints dark red in front; scutellum rather short, hairy, without conspicuous prominences; third s.m. strongly narrowed above, but not nearly to a point; spur of middle tibia strongly bifid, one division with two or three spines; hind femora broad, with a very large tooth beneath near base; hind tibiae with a polished red area at end; venter of abdomen with a large red area in subapical region. The wings are brownish subhyaline, with a dark apical cloud.

Guanajuato, Mexico (*A. Dugès*). U.S. National Museum.

This has the appearance of the species which Schrottky places in his genus *Cyphomelissa*, but the third submarginal cell is as in *Melissa* or *Mesoplia*. It will easily be known from *Mesonychium insigne* (*Melissa insignis*, Sm.), from Orizaba, by the absence of the bright yellow hair. The

venation and middle spur separate it from *M. cærulescens*, Lep.

Mesonychium decoratum (Smith).

Bocas del Toro, Panama, July 6, 1908 (*W. Robinson*).

This agrees with one from F. Smith's collection, obtained by Bates in S. Paulo, Brazil. A form with broader pygidial plate (♀) comes from Rio Mato, Venezuela, October (*Carriker*).

Mesonychium azureum guatemalense (Cockerell).

Cacao, Trece Aguas, Guatemala, April 4 (*Barber & Schwarz*).

This specimen shows that the type was partly denuded. The disc of mesothorax and outer face of hind tibiae are ornamented with green scale-like hairs.

Mesonychium duckei (Friese).

Cabima, Panama, May 17, 1911 (*Aug. Busck*).

The third s.m. is very much broader below than in *M. decoratum*, so that the venation approaches *Cyphomelissa*. After reviewing the subject, I must agree with Ducke that *Mesonychium* is the proper name for this genus, including *Mesoplia* and *Melissa*, and also *Cyphomelissa* as now interpreted by Schrottky.

Colletes cyanescens, Haliday.

I have this from Santiago, Chile, and specimens marked Southern Chile (*M. J. Rivera*) are in the U.S. National Museum. *C. atripilis*, Vachal, is a synonym.

Tricpeolus pruinosus, sp. n.

♀ (type).—Length about 9 mm.

Black, the thorax densely punctured and not shining; basal half of mandibles red; labrum dark reddish; clypeus very minutely and densely punctured; scape red at base and more or less at apex; second and third antennal joints bright ferruginous; a conspicuous patch of creamy-white hair on each side of antennae; mesothorax with a thin pruinose pubescence, anterior margin with two nearly round spots of yellow pubescence; yellowish-white prothoracic hair-band broadly interrupted in middle, ending laterally in round spot on base of tubercles; tubercles reddish; hind margin of mesothorax with a creamy hair-band; scutellum

moderately gibbous, axillæ bluntly conical; area of meta-thorax dull and rough basally; tegulæ bright ferruginous. Wings strongly dusky at apex. Legs obscure ferruginous, spurs red. Abdomen with broad yellow bands on first two segments, that on first anteriorly produced at sides into an evanescent cloud, not a distinct tooth or band-like lobe; third and fourth segments with whitish bands, more or less failing in middle; modified pygidial space subcircular, not very large; last ventral segment produced beyond last dorsal, the very broad end turned downward.

♀.—Similar in appearance, but the legs are mainly black; the anterior tibiæ, middle tibiæ in front, hind tibiæ at base, and the tarsi (the hind ones not wholly) are red; face densely covered with creamy-white hair; mandibles black with a median red band; flagellum black except at base; yellow spots on anterior margin of mesothorax larger, suffusedly elongate posteriorly; abdomen with five yellow bands (successively paler) and one white one, the first two bands more or less suffused with brownish-orange; ventral fringes pale reddish at ends. The dark parts of abdomen are hoary with a fine pale pubescence.

Carcaraña, Argentina (*L. Bruner*, 15). U.S. Nat. Museum.

Resembles *Epeolus burmeisteri*, Friese, but considerably larger, with darker legs, and the patch on anterior margin of mesothorax divided into two spots. *Epeolus* (*Doeringiella*) *bizonatus* (*Holmbg.*), from Bahía Blanca (*Bruner*), is superficially very like *T. pruinatus*, but larger, and easily separated by the extraordinary antennæ.

Isepeolus vierecki, Jörgensen.

Bahía Blanca, Argentine (*Bruner*); San Juan, Argentine (*U. S. Reed*).

It is permissible to correct the specific name, printed "*viecki*" in Jörgensen's work.

Isepeolus bruneri, sp. n.

♀.—Length 10 mm.

Black, mandibles obscurely reddish in middle, but otherwise tegument of head and thorax all black; thorax variegated with white hair as in other species, with two conspicuous black spots on scutellum, and others covering axillæ; disc of mesothorax shining, with well-separated punctures; first two abdominal segments ornamented as in *I. cockerelli*, Jörg., except that the inner processes on second segment are longer; third with a pair of large oblique

(quadrate) patches on hind margin, and each side with a large complicated patch of white, presenting a deep sinus anteriorly; fourth segment with a very large and thick mark having two parts, like the letter H; fifth with two large spots, not reaching apical margin; sixth segment with a small outwardly directed basal spine on each side. Face with white hair, partly black on lower part; front and vertex with black hair; a band of white hair in front of ocelli; scape red at base, middle covered with long white hair, the broad apex intense black; flagellum red beneath; third antennal joint unusually short for the genus, not as long as next three combined; tegulae red. Wings brownish on apical margin, stigma and nervures piceous; second s.m. distinctly narrower above, receiving first r. n. before end. Legs black with the usual white hair-marks, knees red; pleura with black hair.

Caracana, Argentina (*L. Bruner*).

Allied to *I. cockerelli*, but known by the 'abdominal pattern, venation, &c.

Lonchopria alopec, sp. n.

♂.—Length about 14 mm.

Head, thorax, and legs black, with long and abundant fox-red hair. Abdomen shining olive-green, with the same red hair, except the last two segments, which are black, the penultimate with black hair. Mandibles bidentate, reddish apically; malar space very short; clypeus very smooth and polished, the upper part with two rounded elevations, between which is a depression bearing a tuft of very long red hair; labrum bituberculate; antennae very long, reaching to metathorax, flagellum bright ferruginous beneath except at base; face very broad; mesothorax shining, with well-separated punctures; area of metathorax smooth, with an obtuse transverse ridge; tegulae black. Wings dusky, stigma dull ferruginous; third s.m. very oblique; apical segment of abdomen keeled. Maxillary palpi with six subequal joints.

La Paz, Bolivia, Nov. 14, 1898. U.S. National Museum.

A remarkable species, superficially resembling *L. thoracica* (Friese), but with much longer and more abundant hair on abdomen, shorter stigma, quite different mandibles, &c.

According to specimens received from Friese and Jensen-Haarup, it is *L. armata*, Fr., which is the male of *L. chalybaea*, Fr., not *L. anea*, Fr., as Friese first thought. *L. marginata* (Spin.), described as a *Colletes*, the specific name preoccupied, apparently becomes *L. zonalis* (Reed, 1892).

Scastra bombylans (Holmberg).

Babia Blanca, Argentine (Bruner, 2).

Xenoglossa cravfordi, Cockerell.

Guanajuato, Mexico (A. Dugès).

Colletes punctipennis, Cresson.

Brownsville, Texas, 1908 (Jones & Pratt).

New to the United States.

Pseudomelecta californica miranda (Fox).

Mexico (C. F. Baker collection, 2320).

Megachile anthracina, Smith.

Moulmein, I. Burma, Dec. 1910 (R. L. Woglum).

XIV. VII.—*The Khapra Beetle* (*Trogoderma khapra*, sp. n.),
an Indian Grain-pest. By GILBERT J. ARROW.

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THIS very destructive wheat-pest has been studied in great detail by Messrs. J. H. Barnes and A. J. Grove, who have published figures and descriptions of it in all its stages in Mem. Dept. Agric. India (Chemical Series), iv. 6, 1916, p. 172 under the name *Attagenus undulatus*, Motsch. As already stated in a footnote in the 'Review of Applied Entomology,' v. 1917, p. 126, the insect is really a species of *Trogoderma* and appears to be without a specific name. *Attagenus undulatus* is quite a different insect, as I have established from specimens in the British Museum received from Motschulsky himself (see Ann. & Mag. Nat. Hist. (8) xv. 1915, p. 426). Mr. Bainbrigge Fletcher has incorrectly reported me (Agric. Research Inst. Pusa, Bull. 59, p. 14) as saying that the insect common in stored wheat in Northern India should be known by this name. On the contrary, the distribution I recorded shows *A. undulatus* to belong to tropical and not wheat-growing latitudes.

Specimens found in imported wheat have been received at the British Museum during many years past, and I have

regarded them as probably identical with *Trogoderma versicolor*, Creutz., but they have invariably been in such bad condition that exact determination was impracticable. Under the name of "*Kapra*" specimens were sent to the Museum by the late E. T. Atkinson in 1888 and stated to be destructive to wheat in godowns at Delhi. Recently I have been able to examine perfect examples, bred in the greatest abundance from samples of Karachi wheat collected by Mr. J. H. Durrant, and the study of these has convinced me that the species is neither *T. versicolor*, Creutz., nor *T. inclusum*, Lec., the figures and descriptions of which show them to be larger and darker coloured, with different antennæ, and possibly not distinct one from the other. It is, therefore, necessary to give a new name to this exceedingly serious pest, and I propose to adopt the vernacular name by which, according to Messrs. Barnes and Grove, it is known to Indian grain-dealers. It may be briefly diagnosed as follows:—

Trogoderma khapra, sp. n.

Rufo-ferruginea, capite, pronoto corporeque subtus obscurioribus, antennis pedibusque rufis, elytris vago fusco-bifasciatis; ovalis, nitida, corpore subtus aequaliter, supra longius et magis irregulariter griseo-pubescenti; antennis 11-articulatis, articulis 3-7 minutis, 8-11 sat magnis, clavam formantibus, femina ovatum, multo compactam, maris longiorem, apice producto et compresso. Long. 1.75-3 mm.

Although I have seen an enormous number of specimens, the largest scarcely exceeds 3 mm. in length, with the head fully extended, and this is considerably less than the size indicated for the European and N.-American types of Creutzer and Leconte. The elytra are of a rather light red-brown shade, generally marked with two vaguely defined darker transverse bands, and the head and pronotum are nearly always distinctly darker than the elytra, but rarely black. The surface is clothed with grey hairs, which are very easily rubbed off, and the worn specimens found amongst the grain are very smooth and shining. Upon the darker areas of the elytra the hairs are finer and scantier. The antennæ and legs are entirely light in colour.

The males are much smaller on the average than the females and have rather longer antennæ, the joints composing the club, and especially the terminal one, being more elongate.

This insect is found in enormous profusion in cargoes of wheat from Karachi and Bombay; but there is no evidence that it is able to perpetuate itself in Europe, nor has it been found in grain imported from other regions than India.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

February 28th, 1917.—Dr. Alfred Harker, F.R.S., President,
in the Chair.

The following communication was read:—

'Fourth Note on the Piltdown Gravel, with Evidence of a Second Skull of *Eoanthropus dawsoni*.' By Arthur Smith Woodward, LL.D., F.R.S., V.P.G.S. With an Appendix on the Form of the Frontal Pole of an Endocranial Cast of *Eoanthropus dawsoni*. By Prof. Grafton Elliot Smith, M.A., M.D., F.R.S.

Excavations last summer round the margin of the gravel-pit at Piltdown (Sussex) supported the conclusion that the deposit is a varied shingle-bank, and that the three layers containing Paleolithic remains and derived Pliocene fossils are approximately of the same age. Many elongated flints and pieces of Wealden sandstone were observed in the bottom sandy clay with their long axis more or less nearly vertical. No teeth or bones were found, but one nodular flint obtained from the same layer as *Eoanthropus*, seems to have been used by man as a hammer-stone. This is not purposely shaped, but merely battered along faces that happened to be useful when the stone was conveniently held in the hand.

In the winter of 1915 the late Mr. Charles Dawson discovered in a ploughed field, about a mile distant from the original spot, the inner supraorbital part of a frontal bone, the middle of an occipital bone, and a left lower first molar tooth, all evidently human. These are rolled fragments, and the first and third may be referred with certainty to *Eoanthropus dawsoni*; but it is doubtful whether they represent more than one individual. In mineralized condition they agree with the remains of the type-specimen. The piece of frontal bone exhibits the characteristic texture and thickness, with only a very slight supraciliary ridge, and a small development of air-sinuses. The occipital bone is somewhat less thickened than that of the original specimen of *Eoanthropus*, and bears the impression of a less unsymmetrical brain. The external occipital protuberance is a little above the upper limit of the cerebellum, as in Neanderthal man; thus differing from the condition both in *Eoanthropus* and in modern man. The lower molar is exactly similar to the first lower molar of *Eoanthropus* already described, but is more obliquely worn by mastication. Detailed comparison shows that this tooth is human, differing essentially from that of a chimpanzee in its more hypsodont crown, thicker enamel, and less prominence of the neck over the root. The occurrence of the same type of frontal bone with the same type of lower molar in two distinct localities, adds to the probability of their belonging to one and the same species. With these remains were found brown flints in great abundance, and one rolled portion of a lower molar tooth of *Rhinoceros* in the same highly-mineralized condition as the derived Pliocene teeth at Piltdown.

In an Appendix, Prof. G. Elliot Smith expresses the opinion that the endocranial cast of the fragment of frontal bone presents features more primitive and more ape-like than those of any other known member of the human family.

MISCELLANEOUS.

[We have received from the Secretary to the International Commission on Zoological Nomenclature a circular letter giving 39 generic names in Protozoa, Coelenterata, Trematoda, Cestoda, Cirripedia, Tunicata, and Pisces, chiefly Linnæan, which have been proposed for inclusion in the Official List of Zoological Names. Owing to its length we are unable to publish the list in full, but a copy will be sent to any person sufficiently interested on application to the Secretary to the International Commission on Zoological Nomenclature, Smithsonian Institution, United States National Museum, Washington, D.C., U.S.A.]

Notice to the Zoological Profession of a Possible Suspension of the International Rules of Zoological Nomenclature in the Cases of Musca, Linnæus, 1758, and Calliphora, Desvoidy, 1830.

IN accordance with the Rules of the International Zoological Congress, the attention of the zoological profession is invited to the fact that Dr. L. O. Howard, W. Dwight Pierce, and twenty-one other professional zoologists have requested the International Commission on Zoological Nomenclature to exercise its plenary power in the case of the Linnæan genus *Musca*, 1758, and, under suspension of the Rules, to declare *M. domestica* as type of this genus, also, under suspension of the Rules, to validate *Calliphora*, Desvoidy, 1830, with *C. vomitoria* as type.

The request is based on the grounds of practical utility, and an almost unbroken history of consistent usage since 1758 in the case of *Musca*, and since 1830 in the case of *Calliphora*. It is claimed that a strict application of the Rules will produce greater confusion than uniformity.

According to the premises at present before the Commission, if the Rules are strictly applied, the generic name of *Musca* would take either *M. casar* or *M. vomitoria* as type, and the species *M. domestica* would be cited either in *Conostoma*, 1801^{1/2} (type *Ascaris conostoma* = larva of *M. domestica*), or in *Conosoma*, 1802 (type *Ascaris conosoma* = larva of *M. domestica*), or in *Pronosca*, 1915 (type *M. domestica*), thus resulting in a very regrettable change in the nomenclature of the species in question as almost universally used in entomological, zoological, medical, epidemiological, and veterinary literature.

The Secretary of the Commission invites any person interested in these cases of nomenclature to communicate his opinion on the subject as soon as possible, and not later than May 1, 1918, when the subject will be submitted to the Commission for vote.

C. W. STILES,

Secretary to Commission.
25th & E. Streets, N.W.,
Washington, D.C.

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